

# **EMI TEST REPORT**

**Test Report No. : 22IE0004-YW-2**

**Applicant:** Murata Machinery, Ltd.

**Type of Equipment:** Station Modem of Wireless Communication System

**Model No.:** DVM-19202  
(Wireless Communication System : DVM-192)


**FCC ID:** QBODVM192

**Test standard:** FCC Part 15 Subpart C §15.209


**Test Result:** Complied

1. This test report shall not be reproduced 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.
3. This equipment is in compliance with above regulation. We hereby certify that the data contains a true representation of the EMC profile.
4. The test results in this report are traceable to the national or international standards.
5. This test report does not constitute an endorsement by NIST/NVLAP or U.S. Government.

**Date of test:** June 8, 2002

**Tested by:**   
Naoki Sakamoto

Group Leader of EMC section

**Approved by:**   
Kazutoyo Nakanishi  
Site Operation Manager of EMC section

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**A-pex International Co., Ltd.**

**YOKOWA LAB.**

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Telephone: int +81 596 39 1485

Facsimile: int +81 596 39 0232

MF060b(22.05.01)

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## **SECTION 1: Client information**

Company name : Murata Machinery, Ltd.

Address : 2 Nakajima, Hashizume, Inuyama-shi, Aichi 484-8502 Japan

Telephone Number : +81-568-65-3278

Facsimile Number : +81-568-65-3239

Contact Person : Yoshihiro Kataoka

## **SECTION 2: Equipment under test (E.U.T.)**

### **2.1 Identification of E.U.T.**

Type of Equipment : Station Modem of Wireless Communication System

Model No. : DVM-19202  
(Wireless Communication System : DVM-192)

Serial No. : 12117-34

Condition of EUT : Production model

Rating : DC 5V

Country of Manufacture : Japan

Receipt Date of Sample : June 8, 2002

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## 2.2 Product Description

Model: DVM-19202 (referred to as the EUT in this report) is a Station Modem of Wireless Communication System.

FCC 15.203:Antenna requirement

This device is professionally installed and thus meets the antenna requirement of FCC 15.203.

The specification is as follows;

### DVM-19202 (Station Modem)

Microcomputer's clock	: 3.58MHz
RF circuit's oscillator	: 9.1888MHz, 10.245MHz, 12.8MHz, 139.35MHz
Carrier Frequency	: 222.15MHz to 222.75MHz (100kHz step)
Number of Channels	: 7 channels
Modulation	: FSK (F2D)
Antenna Type	: Parallel wire antenna
Output	: -54dBm

### MRB-02 (Booster)

Gain	: 15dB max
Rating	: AC85V-220V 50/60Hz

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### **SECTION 3: Test specification, methods & procedures**

#### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart C Section 15.209  
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators  
Section 15.209 Radiated emission limits; general requirements

#### **3.2 Methods & Procedures**

No.	Item	Test Procedure	Specification	Remarks
1	Radiated emission	ANSI C63.4:2000	Section 15.209(a)	3m

#### **3.3 Additions or deviations to standards**

No addition, deviation or exclusion has been made from standards.

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## **SECTION 4: Operation of E.U.T. during testing**

### **4.1 Operating Modes**

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to typical use.

The operating mode/system were as follows:

Operation:

Transmitting

Station modem

CH1: 222.15MHz (Low)

CH4: 222.45MHz (Mid)

CH7: 222.75MHz (High)

Transmitting continuously.

Modulated by RS232C control at 19.2kbps continuously.

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

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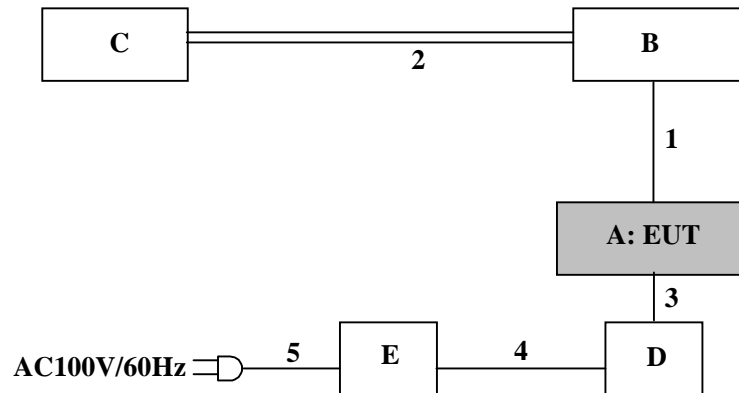
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## 4.2 Configuration and peripherals

### Station modem



\*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	Station Modem	DVM-19202	12117-34	Sankyo Tokushu Musen Co., Ltd.	EUT
B	Matching Box	BM-520-2	-	Sankyo Tokushu Musen Co., Ltd.	-
C	Terminator	TBR-200	-	Sankyo Tokushu Musen Co., Ltd.	-
D	EUT Controller	-	-	Murata Machinery Ltd.	-
E	Regulated Power Supply	PAB18-3A	11302522	Kikusui	-

\* B and D are provided with A on the test.

### List of cables used

No.	Name	Length (m)	Shield	Backshell Material	Remark
1	Coaxial Cable	0.7	Y	Polyethylene	-
2	Transmit/Receive Antenna	3.0	N	Polyethylene	-
3	Control Cable	0.1	N	Vinyl chloride	-
4	DC Power Cable	0.7	N	Vinyl chloride	-
5	AC Power Cable	2.3	N	Vinyl chloride	-

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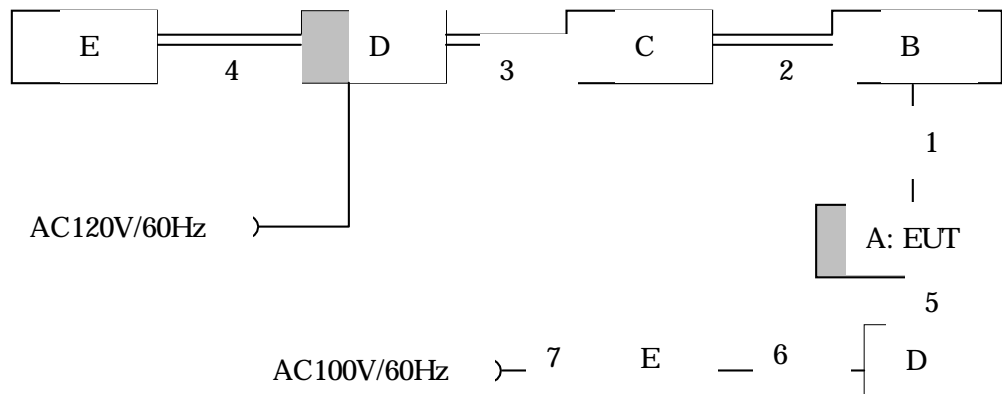
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### Station modem + Booster



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

### Description of EUT and Support equipment

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A	Station Modem	DVM-19202	12117-34	Sankyo Tokushu Musen Co., Ltd.	EUT
B	Matching Box	BM-520-2	-	Sankyo Tokushu Musen Co., Ltd.	-
C	Attenuator	-	-	Murata Machinery Ltd.	-
D	Booster	MEB-02	12065-03	Sankyo Tokushu Musen Co., Ltd.	EUT
E	Terminator	TBR-200	-	Sankyo Tokushu Musen Co., Ltd.	-
F	EUT Controller	-	-	Murata Machinery Ltd.	-
G	Regulated Power Supply	PAB18-3A	11302522	Kikusui	-

\* B and E are provided with A on the test.

### List of cables used

No.	Name	Length (m)	Shield	Backshell Material	Remark
1	Coaxial Cable	0.7	Y	Polyethylene	-
2	Connecting Cable	0.15	N	Polyethylene	-
3	Connecting Cable	0.15	N	Polyethylene	-
4	Transmit/Receive Antenna	3.0	N	Polyethylene	-
5	Control Cable	0.1	N	Vinyl chloride	-
6	DC Power Cable	0.7	N	Vinyl chloride	-
7	AC Power Cable	2.3	N	Vinyl chloride	-
8	AC Power Cable	2.7	N	Vinyl chloride	-

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## **SECTION 6: Radiated emission**

### **6.1 Operating environment**

The test was carried out in an open site.

Temperature : See data  
Humidity : See data

### **6.2 Test configuration**

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane. The rear of EUT, including peripherals was aligned and flush with rear of tabletop. I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged 40cm height to the 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.

A drawing of the set up is shown in the photos of Appendix 1.

### **6.3 Test conditions**

Frequency range : 30MHz - 300MHz (Biconical Antenna) / 300MHz - 1000MHz (Logperiodic antenna) /  
1GHz - 2.5GHz (Horn antenna)  
Test distance : 3m  
EUT position : Table top

### **6.4 Test procedure**

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

Pre check measurements were performed at high-level of 80-90MHz, 270-290MHz and 500-700MHz in a screened room. Otherwise the noise from EUT might have been concealed by the ambient noise.

Measurements were performed with quasi-peak and peak detector.

The measuring antenna height was varied between 1 to 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.

The EUT was put into operation at Transmitting mode.

The radiated emission measurements were made with the following detector function of the test receiver and spectrum analyzer.

Frequency	: 30MHz- 1000MHz
Detector Type	: QP (Test Receiver)
IF Bandwidth	: 120kHz
Frequency	: 1GHz- 2.5GHz
Detector Type	: PK (Spectrum Analyzer)
IF Bandwidth	: RBW: 1MHz, VBW: 1MHz (AV Limit)

### **6.5 Results**

Summary of the test results: Pass

Date: June 8, 2002                      Tested by: Naoki Sakamoto

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Facsimile: int +81 596 39 0232

## **APPENDIX 1: Photographs of test setup**

Page 12- 13: Radiated emission

## **APPENDIX 2: Test instruments**

Page 14: Test instruments

## **APPENDIX 3: Data of EMI test**

Page 15-20: Radiated Spurious emission (30MHz-2500MHz): Station Modem

Page 21: -20dB Bandwidth : Station Modem

Page 22-27: Radiated Spurious emission (30MHz-2500MHz) : Station Modem (Booster)

Page 28-29: Wave chart of Switching noise

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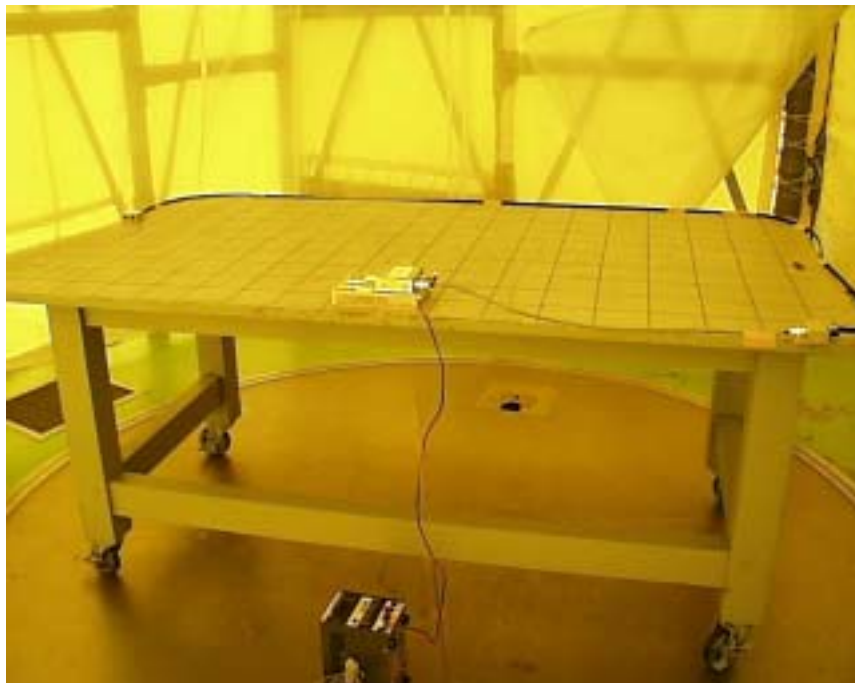
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**Radiated emission**  
**Station Modem**



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***YOKOWA LAB.***

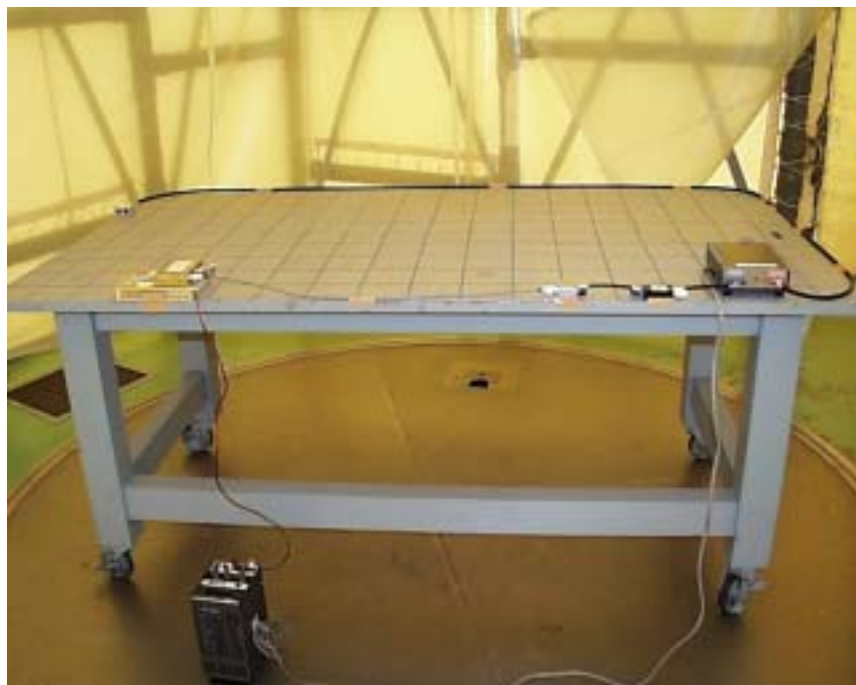
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**Radiated emission**

**Station Modem (Booster)**



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Test Report No : 22IE0004-YW-2

### APPENDIX 3

#### Test Instruments

#### EMI test equipment

Control No.	Instrument	Manufacture	Model No	Test Item	Calibration Date * (interval/month)
AF-03	Pre Amplifier	Anritsu	MH648A	RE	2002/04/01 * 12
AT-04	Attenuator	Anritsu	MP721B	RE	2002/04/04 * 12
BA-04	Biconical Antenna	Schwarzbeck	BBA9106	RE	2002/04/27 * 12
LA-05	Logperiodic Antenna	Schwarzbeck	UHALP9108-A	RE	2001/11/17 * 12
SA-03	Spectrum Analyzer	Hewlett Packard	8567A	RE	2002/04/03 * 12
SA-06	Spectrum Analyzer	Advantest	R3273	RE	2001/11/20 * 12
TR-04	Test Receiver	Rohde & Schwarz	ESVS10	RE	2002/05/01 * 12
AF-06	Pre Amplifier	Agilent	HP8449B	RE	2001/12/21 * 12
HA-01	Horn Antenna	A.H.Systems	SAS-200/571	RE	2002/05/07 * 12
YOATS-02	Open Test Site	JSE	10m	RE	2002/03/17 * 12
AT-11	Attenuator	Anritsu	MP721A	RE	2002/04/04 * 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,
- H/F: Harmonics and voltage fluctuation
- RFI: RFI Power test,
- AT: Antenna terminal disturbance voltage

# DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.  
YOKOWA No.2 OPEN TEST SITE  
Report No. : 22IE0004-YW-2

Applicant : Murata Machinery Limited.  
Kind of Equipment : WIRELESS COMMUNICATION SYSTEM  
Model No. : DVM-19202  
Serial No. : 12117-34  
Power : DC5V  
Mode : Ch.1 : 222.15MHz  
Remarks :  
Date : 6/8/2002  
Test Distance : 3 m  
Temperature : 25 °C  
Humidity : 45 %  
Regulation : Fcc 15C § 15.209(a)

  
Engineer : Naoki Sakamoto

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.	222.16	BB	37.5	31.4	16.6	29.7	3.4	6.0	33.8	27.7	46.0	12.2	18.3
2.	444.91	BB	22.4	22.3	16.5	30.2	5.2	3.0	16.9	16.8	46.0	29.1	29.2
3.	667.66	BB	22.4	22.4	20.5	30.0	6.6	3.0	22.5	22.5	46.0	23.5	23.5
4.	890.41	BB	22.1	22.0	22.0	29.3	8.0	3.0	25.8	25.7	46.0	20.2	20.3

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

All other spurious emissions are more than 20dB below the limits.

ANT. TYPE: 30-300MHz Biconical, 300-1000MHz Logperiodic

# DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.  
YOKOWA No.2 OPEN TEST SITE  
Report No. : 221E0004-YW-2

Applicant : Murata Machinery Limited.  
Kind of Equipment : WIRELESS COMMUNICATION SYSTEM  
Model No. : DVM-19202  
Serial No. : 12117-34  
Power : DC5V  
Mode : Ch4 : 222.45MHz  
Remarks :  
Date : 6/8/2002  
Test Distance : 3 m  
Temperature : 25 °C  
Humidity : 45 %  
Regulation : Fcc 15C § 15.209(a)

Engineer : Naoki Sakamoto

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.	222.45	BB	36.8	31.0	16.6	29.7	3.4	6.0	33.1	27.3	46.0	12.9	18.7
2.	444.90	BB	22.3	22.3	16.5	30.2	5.2	3.0	16.8	16.8	46.0	29.2	29.2
3.	667.37	BB	22.4	22.3	20.5	30.0	6.6	3.0	22.5	22.4	46.0	23.5	23.6
4.	889.81	BB	22.0	22.0	22.0	29.3	8.0	3.0	25.7	25.7	46.0	20.3	20.3

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

All other spurious emissions are more than 20dB below the limits.  
ANT. TYPE: 30-300MHz Biconical, 300-1000MHz Logperiodic



# DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.  
YOKOWA No.2 OPEN TEST SITE  
Report No. : 221E0004-YW-2

Applicant : Murata Machinery Limited.  
Kind of Equipment : WIRELESS COMMUNICATION SYSTEM  
Model No. : DVM-19202  
Serial No. : 12117-34  
Power : DC5V  
Mode : Ch7 : 222.75MHz  
Remarks :  
Date : 6/8/2002  
Test Distance : 3 m  
Temperature : 25 °C  
Humidity : 45 %  
Regulation : Fcc 15C § 15.209(a)

Engineer : Naoki Sakamoto

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.	222.75	BB	36.3	30.9	16.6	29.7	3.4	6.0	32.6	27.2	46.0	13.4	18.8
2.	445.50	BB	22.3	22.3	16.5	30.2	5.2	3.0	16.8	16.8	46.0	29.2	29.2
3.	668.25	BB	22.3	22.3	20.5	30.0	6.6	3.0	22.4	22.4	46.0	23.6	23.6
4.	891.00	BB	22.2	22.1	22.0	29.3	8.0	3.0	25.9	25.8	46.0	20.1	20.2


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

All other spurious emissions are more than 20dB below the limits.  
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Report No. : 221E0004-YW-2

Applicant	: Murata Machinery Limited.
Kind of Equipment	: WIRELESS COMMUNICATION SYSTEM
Model No.	: DVM-19202
Serial No.	: 12117-34
Power	: DC5V
Mode	: Ch.1 : 222.15MHz
Remarks	: 1-2.5GHz (SA: RBW and VBW 1MHz)
Date	: 6/8/2002
Test Distance	: 3 m
Temperature	: 24 °C
Humidity	: 41 %
Regulation	: FCC Part 15 Subpart C Section 15.209 (Average Limit / Upper 1GHz)

  
 \_\_\_\_\_  
 Engineer : Naoki Sakamoto

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.	1110.75	BB	45.2	45.8	25.3	38.6	1.5	0.0	33.4	34.0	54.0	20.6	20.0
2.	1332.90	BB	45.2	45.9	26.5	38.3	1.7	0.0	35.1	35.8	54.0	18.9	18.2
3.	1555.05	BB	45.7	45.5	27.7	38.1	2.0	0.0	37.3	37.1	54.0	16.7	16.9
4.	1777.20	BB	46.1	45.7	29.0	37.9	2.2	0.0	39.4	39.0	54.0	14.6	15.0
5.	1999.35	BB	46.2	45.8	30.3	37.8	2.4	0.0	41.1	40.7	54.0	12.9	13.3
6.	2221.50	BB	45.8	45.6	30.9	37.7	2.6	0.0	41.6	41.4	54.0	12.4	12.6

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

All other spurious emissions are more than 20dB below the limits.  
ANT. TYPE: 1-2.5GHz DRG Horn

# DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.  
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Kind of Equipment : WIRELESS COMMUNICATION SYSTEM  
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Serial No. : 12117-34  
Power : DC5V  
Mode : Ch4 : 222.45MHz  
Remarks : 1-2.5GHz (SA: RBW and VBW 1MHz)  
Date : 6/8/2002  
Test Distance : 3 m  
Temperature : 24 °C  
Humidity : 41 %  
Regulation : FCC Part 15 Subpart C Section 15.209 (Average Limit / Upper 1GHz)

Engineer : Naoki Sakamoto

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.	1112.25	BB	45.2	45.5	25.3	38.6	1.5	0.0	33.4	33.7	54.0	20.6	20.3
2.	1334.70	BB	45.8	45.6	26.5	38.3	1.7	0.0	35.7	35.5	54.0	18.3	18.5
3.	1557.15	BB	45.9	46.0	27.7	38.1	2.0	0.0	37.5	37.6	54.0	16.5	16.4
4.	1779.60	BB	46.3	46.3	29.0	37.9	2.2	0.0	39.6	39.6	54.0	14.4	14.4
5.	2002.05	BB	45.5	45.9	30.3	37.8	2.4	0.0	40.4	40.8	54.0	13.6	13.2
6.	2224.50	BB	45.7	45.7	30.9	37.7	2.6	0.0	41.5	41.5	54.0	12.5	12.5

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

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Date : 6/8/2002  
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Humidity : 41 %  
Regulation : FCC Part 15 Subpart C Section 15.209 (Average Limit / Upper 1GHz)

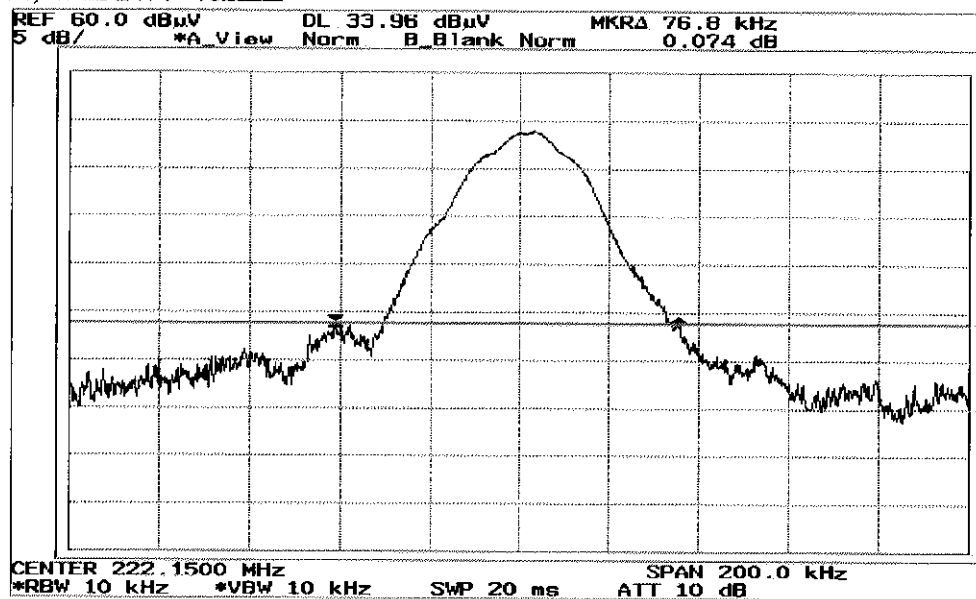
Engineer : Naoki Sakamoto

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.	1113.75	BB	45.6	45.8	25.3	38.6	1.5	0.0	33.8	34.0	54.0	20.2	20.0
2.	1336.50	BB	45.2	46.2	26.5	38.3	1.7	0.0	35.1	36.1	54.0	18.9	17.9
3.	1559.25	BB	45.8	45.6	27.7	38.1	2.0	0.0	37.4	37.2	54.0	16.6	16.8
4.	1782.00	BB	45.3	45.8	29.0	37.9	2.2	0.0	38.6	39.1	54.0	15.4	14.9
5.	2004.75	BB	45.8	44.5	30.3	37.8	2.4	0.0	40.7	39.4	54.0	13.3	14.6
6.	2227.50	BB	45.6	45.8	30.9	37.7	2.6	0.0	41.4	41.6	54.0	12.6	12.4

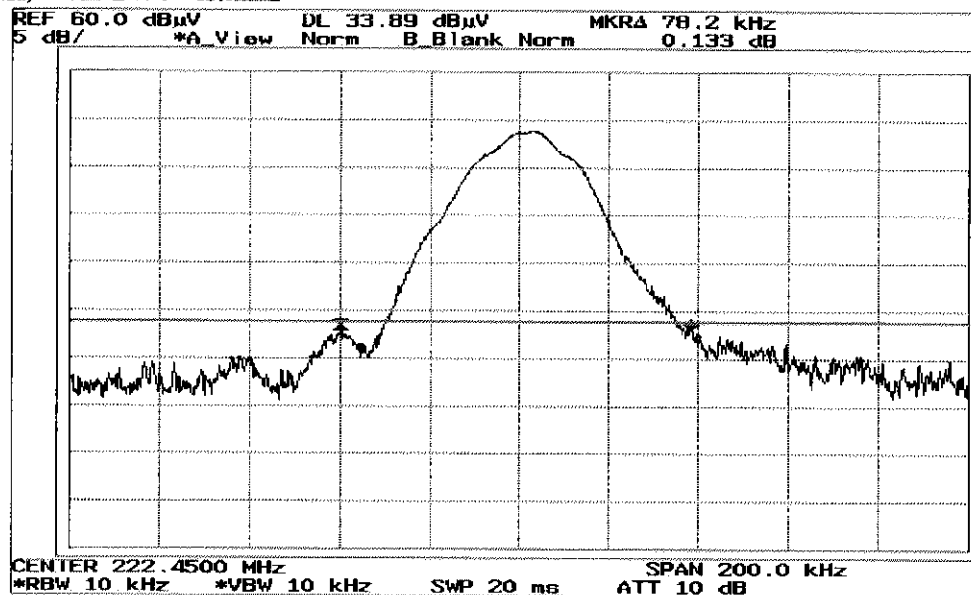
CALCULATION:  $\text{READING}[\text{dB } \mu \text{V}] + \text{ANT. FACTOR}[\text{dB/m}] + \text{CABLE LOSS}[\text{dB}] - \text{AMP. GAIN}[\text{dB}] + \text{ATTEN}[\text{dB}]$ .

All other spurious emissions are more than 20dB below the limits.  
ANT. TYPE: 1-2.5GHz DRG Horn

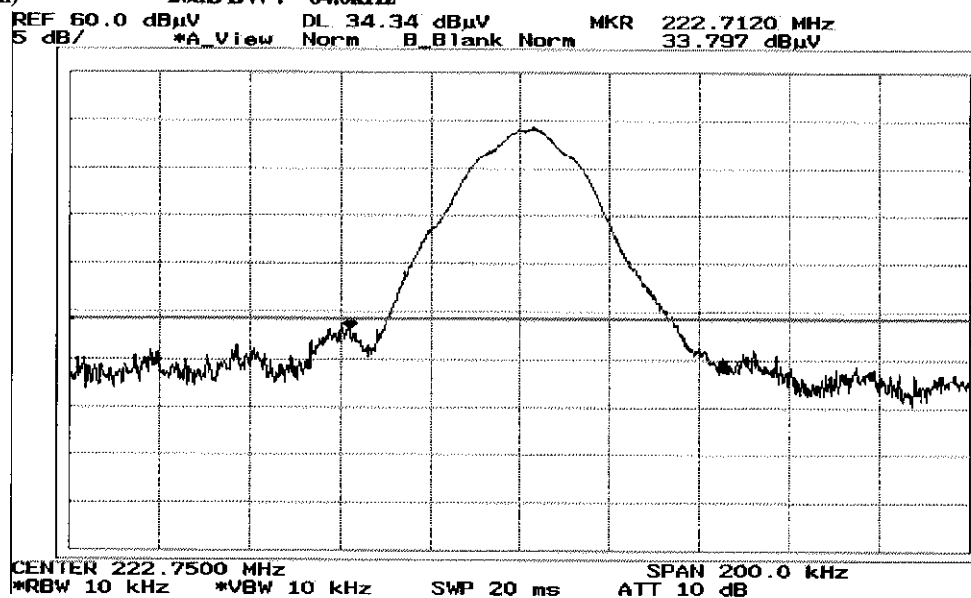
1. 222.15MHz(Low) -20dB BW : 76.8kHz



2. 222.45MHz(Mid) -20dB BW : 65.0kHz



3. 222.75MHz(Hi) -20dB BW : 64.0kHz



# DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.  
YOKOWA No.2 OPEN TEST SITE  
Report No. : 22IE0004-YW-2

Applicant : Murata Machinery Limited.  
Kind of Equipment : WIRELESS COMMUNICATION SYSTEM  
Model No. : DVM-19202  
Serial No. : 12117-34  
Power : DC5V  
Mode : Ch.1 : 222.15MHz  
Remarks : Booster  
Date : 6/8/2002  
Test Distance : 3 m  
Temperature : 25 °C  
Humidity : 45 %  
Regulation : Fcc 15C § 15.209(a)

  
Engineer : Naoki Sakamoto

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.	47.29	BB	25.0	38.9	12.0	29.8	1.6	6.0	14.8	28.7	40.0	25.2	11.3
2.	96.81	BB	45.0	48.7	9.4	29.9	2.2	6.0	32.7	36.4	43.5	10.8	7.1
3.	106.22	BB	45.1	45.8	11.1	29.8	2.5	6.0	34.9	35.6	43.5	8.6	7.9
4.	125.28	BB	31.8	39.3	13.8	29.8	2.6	6.0	24.4	31.9	43.5	19.1	11.6
5.	150.65	BB	34.8	35.8	15.0	29.7	2.8	6.0	28.9	29.9	43.5	14.6	13.6
6.	222.15	BB	34.4	29.4	16.6	29.7	3.4	6.0	30.7	25.7	46.0	15.3	20.3
7.	444.31	BB	22.4	22.4	16.5	30.2	5.2	3.0	16.9	16.9	46.0	29.1	29.1
8.	666.45	BB	22.5	22.3	20.5	30.0	6.6	3.0	22.6	22.4	46.0	23.4	23.6
9.	888.60	BB	22.1	22.0	22.0	29.3	8.0	3.0	25.8	25.7	46.0	20.2	20.3

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

All other spurious emissions are more than 20dB below the limits.  
ANT. TYPE: 30-300MHz Biconical, 300-1000MHz Logperiodic

# DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.  
YOKOWA No.2 OPEN TEST SITE  
Report No. : 22IE0004-YW-2

Applicant : Murata Machinery Limited.  
Kind of Equipment : WIRELESS COMMUNICATION SYSTEM  
Model No. : DVM-19202  
Serial No. : 12117-34  
Power : DC5V  
Mode : Ch4 : 222.45MHz  
Remarks : Booster  
Date : 6/8/2002  
Test Distance : 3 m  
Temperature : 25 °C  
Humidity : 45 %  
Regulation : Fcc 15C § 15.209(a)

Engineer : Naoki Sakamoto

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.	47.38	BB	26.0	39.1	11.9	29.8	1.6	6.0	15.7	28.8	40.0	24.3	11.2
2.	96.87	BB	44.0	48.0	9.4	29.9	2.2	6.0	31.7	35.7	43.5	11.8	7.8
3.	106.30	BB	44.0	44.7	11.1	29.8	2.5	6.0	33.8	34.5	43.5	9.7	9.0
4.	125.37	BB	31.6	39.3	13.8	29.8	2.6	6.0	24.2	31.9	43.5	19.3	11.6
5.	150.76	BB	33.6	35.0	15.0	29.7	2.8	6.0	27.7	29.1	43.5	15.8	14.4
6.	222.45	BB	33.3	28.0	16.6	29.7	3.4	6.0	29.6	24.3	46.0	16.4	21.7
7.	444.90	BB	22.2	22.2	16.5	30.2	5.2	3.0	16.7	16.7	46.0	29.3	29.3
8.	667.37	BB	22.3	22.3	20.5	30.0	6.6	3.0	22.4	22.4	46.0	23.6	23.6
9.	889.92	BB	22.0	22.0	22.0	29.3	8.0	3.0	25.7	25.7	46.0	20.3	20.3

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

All other spurious emissions are more than 20dB below the limits.  
ANT. TYPE: 30-300MHz Biconical, 300-1000MHz Logperiodic

# DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.  
YOKOWA No.2 OPEN TEST SITE  
Report No. : 221E0004-YW-2

Applicant : Murata Machinery Limited.  
Kind of Equipment : WIRELESS COMMUNICATION SYSTEM  
Model No. : DVM-19202  
Serial No. : 12117-34  
Power : DC5V  
Mode : Ch7 : 222.75MHz  
Remarks : Booster  
Date : 6/8/2002  
Test Distance : 3 m  
Temperature : 25 °C  
Humidity : 45 %  
Regulation : Fcc 15C § 15.209(a)

Engineer : Naoki Sakamoto

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.	47.36	BB	26.1	38.8	12.0	29.8	1.6	6.0	15.9	28.6	40.0	24.1	11.4
2.	96.85	BB	43.4	47.6	9.4	29.9	2.2	6.0	31.1	35.3	43.5	12.4	8.2
3.	106.27	BB	44.0	44.6	11.1	29.8	2.5	6.0	33.8	34.4	43.5	9.7	9.1
4.	125.38	BB	30.6	40.3	13.8	29.8	2.6	6.0	23.2	32.9	43.5	20.3	10.6
5.	150.72	BB	34.0	35.6	15.0	29.7	2.8	6.0	28.1	29.7	43.5	15.4	13.8
6.	222.74	BB	33.6	28.5	16.6	29.7	3.4	6.0	29.9	24.8	46.0	16.1	21.2
7.	445.49	BB	22.4	22.3	16.5	30.2	5.2	3.0	16.9	16.8	46.0	29.1	29.2
8.	668.25	BB	22.4	22.3	20.5	30.0	6.6	3.0	22.5	22.4	46.0	23.5	23.6
9.	890.99	BB	22.2	22.1	22.0	29.3	8.0	3.0	25.9	25.8	46.0	20.1	20.2


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

All other spurious emissions are more than 20dB below the limits.  
ANT. TYPE: 30-300MHz Biconical, 300-1000MHz Logperiodic



# DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.  
YOKOWA No.2 OPEN TEST SITE  
Report No. : 221E0004-YW-2

Applicant : Murata Machinery Limited.  
Kind of Equipment : WIRELESS COMMUNICATION SYSTEM  
Model No. : DVM-19202  
Serial No. : 12117-34  
Power : DC5V  
Mode : Ch.1 : 222.15MHz  
Remarks : Booster, 1-2.5GHz (SA: RBW and VBW 1MHz)   
Date : 6/8/2002  
Test Distance : 3 m  
Temperature : 24 °C Engineer : Naoki Sakamoto  
Humidity : 41 %  
Regulation : FCC Part 15 Subpart C Section 15.209 (Average Limit / Upper 1GHz)

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.	1110.75	BB	46.0	45.9	25.3	38.6	1.5	0.0	34.2	34.1	54.0	19.8	19.9
2.	1332.90	BB	45.2	45.8	26.5	38.3	1.7	0.0	35.1	35.7	54.0	18.9	18.3
3.	1555.05	BB	45.7	45.1	27.7	38.1	2.0	0.0	37.3	36.7	54.0	16.7	17.3
4.	1777.20	BB	45.9	45.8	29.0	37.9	2.2	0.0	39.2	39.1	54.0	14.8	14.9
5.	1999.35	BB	45.5	45.5	30.3	37.8	2.4	0.0	40.4	40.4	54.0	13.6	13.6
6.	2221.50	BB	45.9	45.7	30.9	37.7	2.6	0.0	41.7	41.5	54.0	12.3	12.5

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

All other spurious emissions are more than 20dB below the limits.  
ANT. TYPE: 1-2.5GHz DRG Horn

# DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.  
YOKOWA No.2 OPEN TEST SITE  
Report No. : 221E0004-YW-2

Applicant : Murata Machinery Limited.  
Kind of Equipment : WIRELESS COMMUNICATION SYSTEM  
Model No. : DVM-19202  
Serial No. : 12117-34  
Power : DC5V  
Mode : Ch4 : 222.45MHz  
Remarks : Booster, 1-2.5GHz (SA: RBW and VBW 1MHz)  
Date : 6/8/2002  
Test Distance : 3 m  
Temperature : 24 °C  
Humidity : 41 %  
Regulation : FCC Part 15 Subpart C Section 15.209 (Average Limit / Upper 1GHz)

Engineer : Naoki Sakamoto

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.	1112.25	BB	45.8	45.8	25.3	38.6	1.5	0.0	34.0	34.0	54.0	20.0	20.0
2.	1334.70	BB	45.9	46.0	26.5	38.3	1.7	0.0	35.8	35.9	54.0	18.2	18.1
3.	1557.15	BB	46.0	46.2	27.7	38.1	2.0	0.0	37.6	37.8	54.0	16.4	16.2
4.	1779.60	BB	45.8	46.0	29.0	37.9	2.2	0.0	39.1	39.3	54.0	14.9	14.7
5.	2002.05	BB	45.7	45.5	30.3	37.8	2.4	0.0	40.6	40.4	54.0	13.4	13.6
6.	2224.50	BB	45.5	45.6	30.9	37.7	2.6	0.0	41.3	41.4	54.0	12.7	12.6

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

All other spurious emissions are more than 20dB below the limits.  
ANT. TYPE: 1-2.5GHz DRG Horn

# DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.  
YOKOWA No.2 OPEN TEST SITE  
Report No. : 221E0004-YW-2

Applicant : Murata Machinery Limited.  
Kind of Equipment : WIRELESS COMMUNICATION SYSTEM  
Model No. : DVM-19202  
Serial No. : 12117-34  
Power : DC5V  
Mode : Ch7 : 222.75MHz  
Remarks : Booster, 1-2.5GHz (SA: RBW and VBW 1MHz)  
Date : 6/8/2002  
Test Distance : 3 m  
Temperature : 24 °C  
Humidity : 41 %  
Regulation : FCC Part 15 Subpart C Section 15.209 (Average Limit / Upper 1GHz)

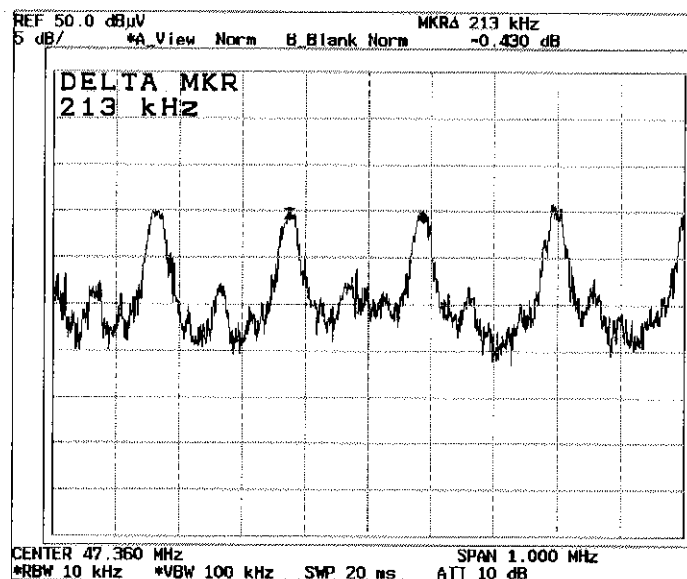
Engineer : Naoki Sakamoto

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.	1113.75	BB	46.0	45.6	25.3	38.6	1.5	0.0	34.2	33.8	54.0	19.8	20.2
2.	1336.50	BB	45.8	46.1	26.5	38.3	1.7	0.0	35.7	36.0	54.0	18.3	18.0
3.	1559.25	BB	45.8	45.9	27.7	38.1	2.0	0.0	37.4	37.5	54.0	16.6	16.5
4.	1782.00	BB	45.5	45.5	29.0	37.9	2.2	0.0	38.8	38.8	54.0	15.2	15.2
5.	2004.75	BB	45.0	45.2	30.3	37.8	2.4	0.0	39.9	40.1	54.0	14.1	13.9
6.	2227.50	BB	45.3	45.7	30.9	37.7	2.6	0.0	41.1	41.5	54.0	12.9	12.5

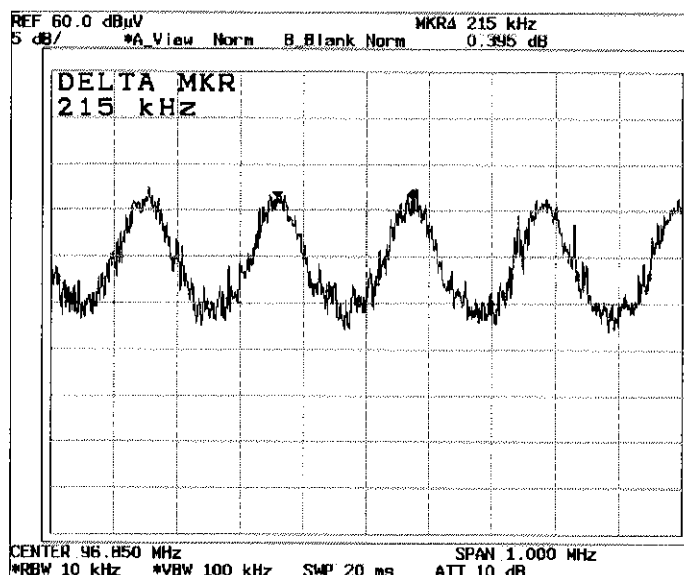
CALCULATION:  $\text{READING}[\text{dB } \mu\text{V}] + \text{ANT. FACTOR}[\text{dB/m}] + \text{CABLE LOSS}[\text{dB}] - \text{AMP. GAIN}[\text{dB}] + \text{ATTEN}[\text{dB}]$ .

All other spurious emissions are more than 20dB below the limits.  
ANT. TYPE: 1-2.5GHz DRG Horn

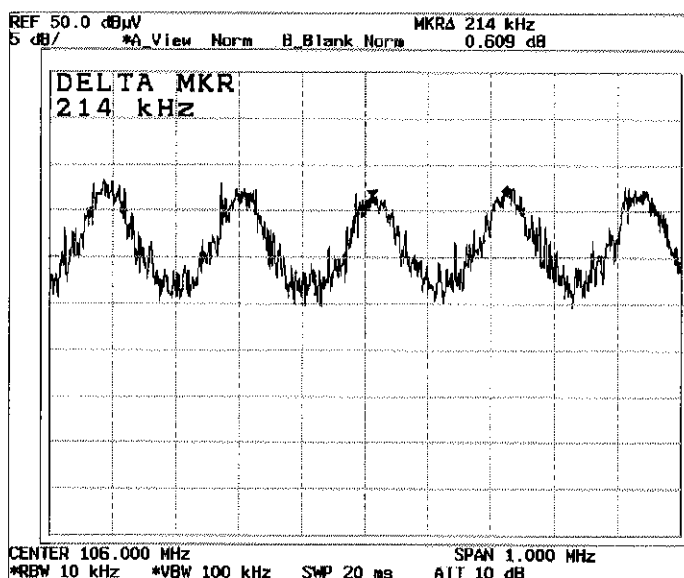
1. 47MHz



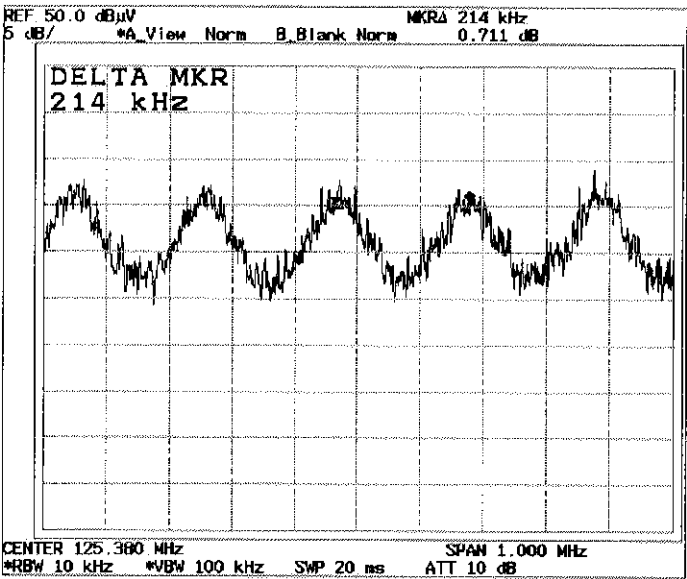
2. 96MHz



3. 106MHz



4. 125MHz



5. 150MHz

