

EMI TEST REPORT

Test Report No. : 21FE0012-YK-2

Applicant: Advanced Technology and Systems Co., Ltd.
Type of Equipment: RAID Subsystem
Model No.: AXRR-J764SS
Test standard: FCC Part 15 Subpart B Class B
Test Result: Complied

1. This test report shall not be reproduced except in full, 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 contain a true representation of the EMC profile.
4. The test results in this test 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:

EMI: January 30, 2001

Tested by:

EMI: A. Sato

Akira Sato
EMC section

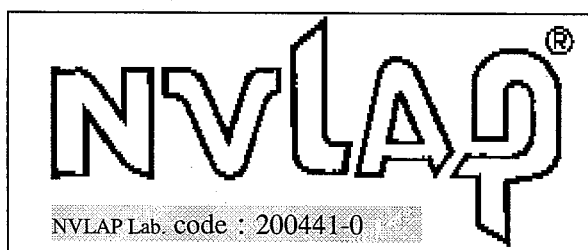
Approved by:

T. Hashimoto

Tetsuya Hashimoto
Director of Yamkita EMC Lab

Date of issue: February 6, 2001

Form Version No.2



This laboratory is registered by the NIST/NVLAP, U.S.A. The tests reported herein have been performed in accordance with its terms of registration.

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SECTION 1: Client information

Company Name : Advanced Technology and Systems Co., Ltd.
Brand Name : ADTX
Address : 9F East Tower, Yokohama Business Park 134,
Gohdo-cho Hodogaya-ku, yokohama-shi, Kanagawa Japan
Telephone Number : +81-45-334-0040
Facsimile Number : +81-45-334-0094
Contact Person : Tetsushi Kobayashi

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

2.1 Identification of E.U.T.

Unique Type Identification : RAID Subsystem

Model No. : AXRR-J764SS
Rating : AC100/240V, 50Hz/60Hz, 150W
Country of Manufacture : JAPAN
Receipt Date of Sample : January 26,27, 2001

2.2 Product description

Advanced Technology and Systems Co., Ltd. , Model: AXRR-J764SS (referred to as the EUT in this report) is a RAID Subsystem.

The clock frequency used in EUT is 15MHz, 20MHz, 40MHz, 60MHz, 80MHz.

RAID 0, 1, 0+1, 5
Dual Power Supply
HDD/Power Supply/FAN Hot swap support
Ultra2 SCSI Interface (MAX 40MB/sec translate)
2channel SCSI Interface

AXRR-J764SS has series models.
The way of naming of a series model is as follows.
AXRR-JnnnS **
n : 0 to 9, * : Blank or A to Z
AXRR-J764SS is the highest rank model.
See the user's manual Appendix A for the details.

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SECTION 3: Test specification, methods & procedures

3.1 Test specification

Test Specification : FCC Part 15 Subpart B

Title : FCC 47CFR Part15 Radio Frequency Device
Subpart B Unintentional Radiators(Subpart C Intentional Radiators)

3.2 Methods & Procedures

No.	Item	Test Procedure	Specification	Remarks
1	Conducted emission	FCC/ANSI C63.4:1992	Class B	LISN
2	Radiated emission	FCC/ANSI C63.4:1992	Class B	3m

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

4.1 Operating modes

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

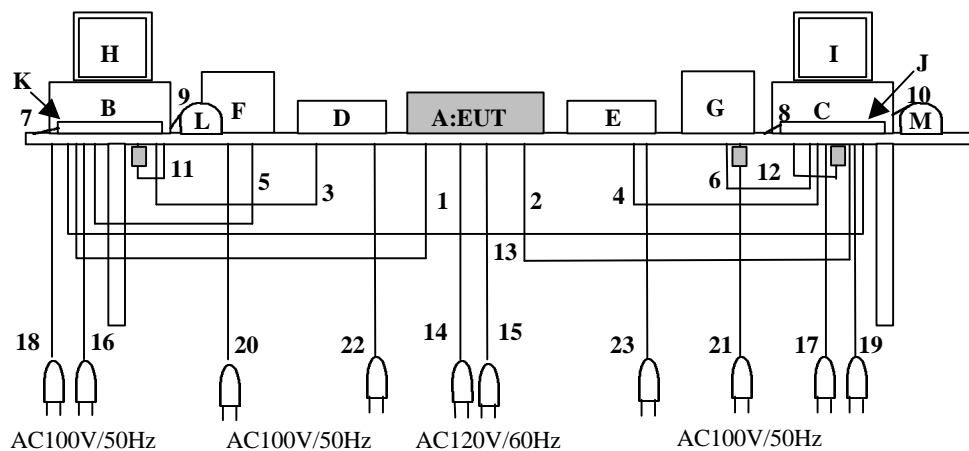
The sequence is used: Random Read/Write

Operation: Windows NT4.0 data file read/write by Xcopy command.

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

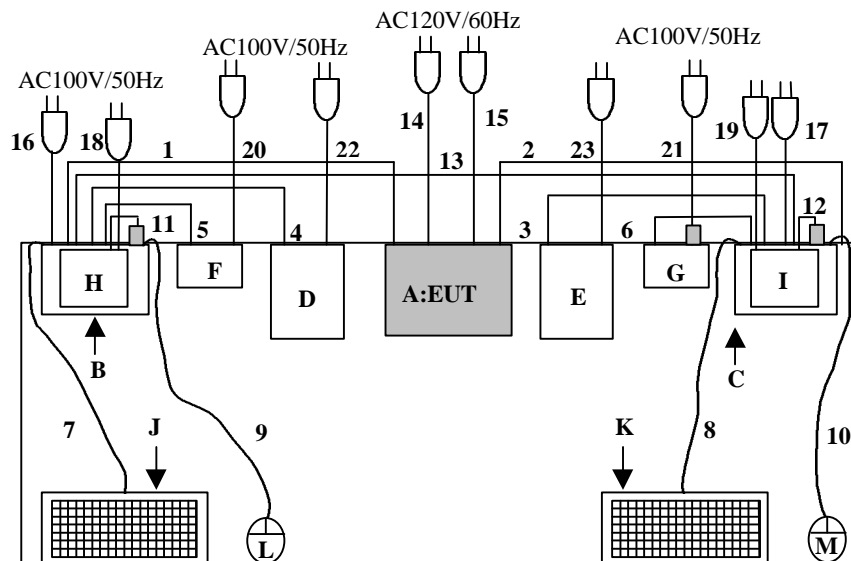
4.2 Configuration and peripherals

Front View



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

Top View



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

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Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	FCC ID
A	RAID Subsystem	AXRR-J764SS	A1DEV#2	ADTX	-
B	Personal Computer	J500C	TYLJQ	DELL	-
C	Personal Computer	J500C	TYLJL	DELL	-
D	Scanner	HPC7190A	SG933160XK	HP	-
E	Scanner	HPC7190A	SG933160ZC	HP	-
F	Printer	BJF100	-	Canon	-
G	Printer	BJF200	ETF52713	Canon	-
H	Monitor	E550	2853TPOA4SA9	DELL	JVP7254E
I	Monitor	E550	2853TPOA4RA9	DELL	JVP7254E
J	Keyboard	008436U	38843-9AP-3780	DELL	-
K	Keyborad	008436U	38843-06C-4092	DELL	-
L	Mouse	Intel imouse 1.2A	-	Microsoft	-
M	Mouse	Intel imouse 1.2A	-	Microsoft	-

Meshed column are represented EUT

List of cables used

No.	Name	Length (m)	Shield	Backshell material
1	SCSI Cable	12.0	Shielded	P.V.C.
2	SCSI Cable	12.0	Shielded	P.V.C.
3	USB Cable	1.8	Shielded	P.V.C.
4	USB Cable	1.8	Shielded	P.V.C.
5	Parallel Cable	2.0	Unshielded	P.V.C.
6	Parallel Cable	2.0	Unshielded	P.V.C.
7	Keyboard Cable	2.1	Shielded	P.V.C.
8	Keyboard Cable	2.1	Shielded	P.V.C.
9	Mouse Cable	1.8	Unshielded	P.V.C.
10	Mouse Cable	1.8	Unshielded	P.V.C.
11	Monitor Cable	1.8	Shielded	P.V.C.
12	Monitor Cable	1.8	Shielded	P.V.C.
13	Serial Cable	3.0	Unshielded	P.V.C.
14	AC Cable	1.8	Unshielded	P.V.C.
15	AC Cable	1.8	Unshielded	P.V.C.
16	AC Cable	1.8	Unshielded	P.V.C.
17	AC Cable	1.8	Unshielded	P.V.C.
18	AC Cable	1.8	Unshielded	P.V.C.
19	AC Cable	1.8	Unshielded	P.V.C.
20	AC Cable	1.8	Unshielded	P.V.C.
21	AC Cable	1.8	Unshielded	P.V.C.
22	AC Cable	1.8	Unshielded	P.V.C.
23	AC Cable	1.8	Unshielded	P.V.C.

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SECTION 5: Summary of test results

5.1 Test results

No.	Item	Test Procedure	Specification	Remarks	Results
1	Conducted emission	FCC/ANSI C63.4:1992	Class B	LISN	Complied
2	Radiated emission	FCC/ANSI C63.4:1992	Class B	3m	Complied

A-PEX INTERNATIONAL hereby confirms that E.U.T. , in the configuration tested, complies with the specifications FCC Part15 Subpart B.

5.1.1 Data of conducted emission test

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range (450KHz-30MHz).

The final data represents worst-case emissions.

The minimum margin to the limit is as follows :

Power Line for:AC1

Frequency (MHz)	Line (N/L)	Receiver Reading (dBuV)	LISN Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
8.6017	L1	42.2	0.4	43.5	48.0	4.5

Power Line for:AC2

Frequency (MHz)	Line (N/L)	Receiver Reading (dBuV)	LISN Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
8.9809	L1	44.1	0.4	45.5	48.0	2.5

* All readings are quasi-peak mode.

* LISN Factor = include Cable loss.

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5.1.2 Data of radiated emission test

The initial step in collecting radiated data was a spectrum analyzer peak scan of the measurement range (30MHz-1000MHz).

The final data was reported in the worst-case emissions.

The minimum margin to the limit is as follows :

Frequency (MHz)	Receiver Reading (dBuV)	Correction Factor (dB/m)	Field Strength (dBuV/m)	Limit (dBuV/m)	Margin (dB)
95.95	50.0	-9.8	40.2	43.5	3.3

* All readings are quasi-peak mode.

Field strength calculation

The field strength is calculated by adding the Antenna Factor, Cable Factor and Antenna Pad, and subtracting the Amplifier Gain from the measured reading. The sample calculation is as follows :

$$FS = RA + \frac{AF + CF + AT - AG}{\text{Correction factor}}$$

where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Factor

AT = Antenna Pad

AG = Amplifier Gain

Assume a receiver reading of 50.0dBuV is obtained. The antenna Factor of 10.0dB, Cable Factor of 2.4dB and Antenna Pad of 6.0dB is added.

The Amplifier Gain of 28.2dB is subtracted, giving a field strength of 40.2dBuV/m.

$$FS = 50.0 + 10.0 + 2.4 + 6.0 - 28.2 = 40.2\text{dBuV/m}$$

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5.2 Uncertainty

Conducted emission test

The measurement uncertainty (with a 95% confidence level) for this test was ± 2.0 dB.

The data listed in this test report has enough margin, more than 2.0dB.

Radiated emission test

The measurement uncertainty (with a 95% confidence level) for this test was ± 3.3 dB.

The data listed in this test report has enough margin, more than 3.3dB.

5.3 Test instruments

Refer to SECTION 6: TEST INSTRUMENTS

5.4 Test location

A-PEX International Co.,Ltd. Yamakita No.1 Open Test Site.
907, Kawanishi, Yamakita-machi, Ashigarakami-gun, Kanagawa-ken 258-0124 Japan
Telephone number : +81-465-77-1011
Facsimile number : +81-465-77-2112

This site has been fully described in a report dated September 24, 1999 submitted to FCC office, and accepted in a letter dated October 8, 1999 (95486)

* NVLAP Lab. code : 200441-0

5.5 Photographs of test setup

Refer to Appendix 1.

5.6 Data of EMI test

Refer to Appendix 2.

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SECTION 6: Test instruments

EMI test instrument

Instrument	Manufacturer	Model No.	Control No.	Calibration date / Interval
Pre-Amplifier	Hewlett Packard	8447D	KAF-01	September 5, 2000 / 1year
Biconical Antenna	Schwarzbeck	BBA9106	KBA-01	September 3, 2000 / 1year
Logperiodic Antenna	Schwarzbeck	USLP9143	KLA-02	September 3, 2000 / 1year
LISN	Schwarzbeck	NSLK8126	KLS-01	September 7, 2000 / 1year
LISN	Schwarzbeck	NSLK8127	KLS-02	September 7, 2000 / 1year
LISN	Schwarzbeck	NSLK8129	KLS-06	January 9, 2001 / 1year
Pulse Limitter	PMM	PL-01	KPL-01	September 15, 2000 / 1year
Spectrum Analyzer	ADVANTEST	R3265	KSA-02	December 10, 2000 / 1year
Test Receiver	Rohde & Schwarz	ESCS30	KTR-02	December 4, 2000 / 1year

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

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SECTION 7: Conducted emission

7.1 Operating environment

The test was carried out in a shielded room 8.0 x 5.0 x 2.5m.

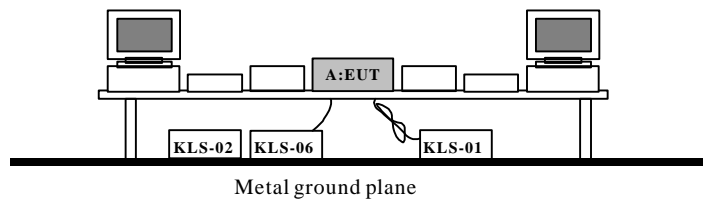
Temperature : 20 degree
Humidity : 33 %

7.2 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 tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flush with rear of tabletop. All other surfaces of tabletop was at least 80cm from any other grounded conducting surface. I/O cables and AC 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 at a 40cm height to the ground plane. Each EUT current-carrying power lead, except the ground (safety) lead, were individually connected through a LISN to the input power source. All unused 50ohm connectors of the LISN were resistively terminated in 50ohm when not connected to the measuring equipment.

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

Figure 1. Drawing of the test set-up



7.3 Test conditions

Frequency range : 0.45MHz-30MHz

EUT position : Table top

7.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT within a screened 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 quasi-peak detector and if required, with an average detector.

The EUT was put into operation at Random Read/Write mode .

7.5 Results

Summary of the test results: Pass

Date: January 30, 2001

Test engineer: A. Sato

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YAMAKITA LAB.

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SECTION 8: Radiated emission

8.1 Operating environment

The test was carried out in an open test site.

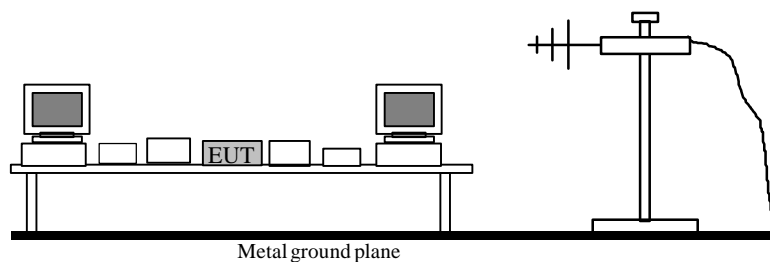
Temperature : 17 degree
Humidity : 38 %

8.2 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 fig. 2 and the photos of Appendix 1.

Figure 2. Drawing of the test set-up



8.3 Test conditions

Frequency range : 30MHz - 1000MHz
Test distance : 3m
EUT position : Table top

8.4 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 within a screened room or used search coil for ambient noise at high-level, especially from 272MHz to 288MHz. Measurements were performed with a quasi-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 Random Read/Write mode.

8.5 Results

Summary of the test results: Pass

Date: January 30, 2001

Test engineer: A. Sato

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APPENDIX 1: Photographs of test setup

This section contains the following photographs:

Page 14 : Conducted emission

Page 15 : Radiated emission

Conducted emission



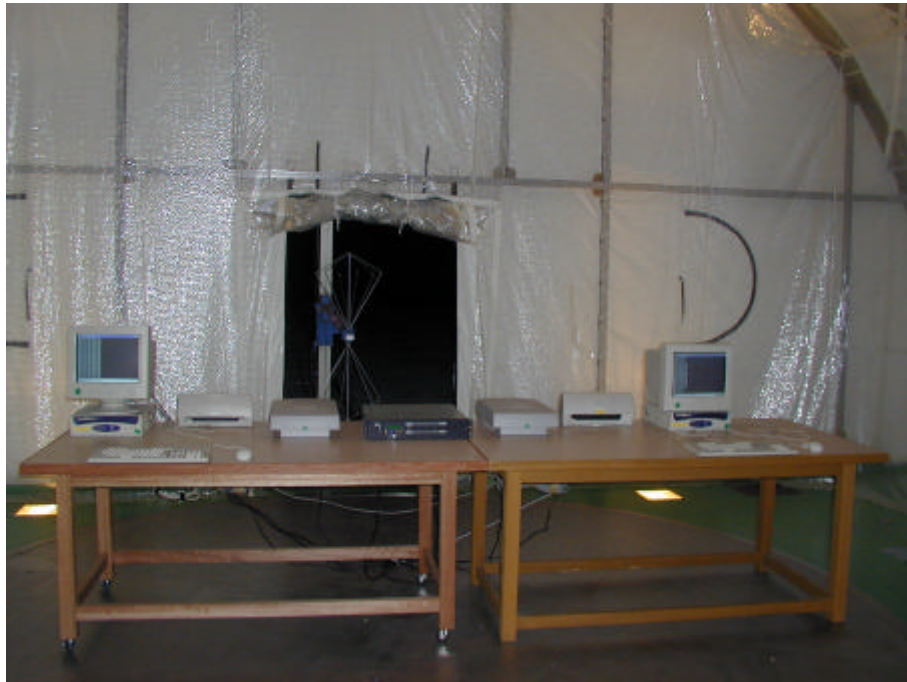
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Radiated emission



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APPENDIX 2: Data of EMI test

This section contains the following data

Conducted emission :	Power Line for AC1	<u>A2-01 to A2-03</u>
	Power Line for AC2	<u>A2-04 to A2-06</u>
Radiated emission :		<u>A2-07 to A2-08</u>

DATA OF CONDUCTION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.1 Open Test Site
Report No. : 21FE0012-YK-2

Applicant : Advanced Technology and Systems Co., Ltd
Kind of Equipment : RAID Subsystem
Model No. : AXRR-J764SS
Serial No. : A1DEV#2
Power : AC120V/60Hz
Mode : Random Read/Write
Remarks : AC-1
Date : 1/30/2001
Phase : Single Phase
Temperature : 20 °C
Humidity : 33 %
Regulation : FCC Part15B CLASS B

A. Sato

Engineer : Akira Sato

No.	FREQ. [MHz]	READING (N)		READING (L1)		LISN FACTOR [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS		MARGIN	
		QP [dBuV]	AV	QP [dBuV]	AV				QP [dBuV]	AV	QP [dBuV]	AV	QP [dB]	AV
1.	0.5019	37.2	-	36.7	-	0.4	0.2	0.0	37.8	-	48.0	0.0	10.2	-
2.	0.7017	36.7	-	36.2	-	0.4	0.2	0.0	37.3	-	48.0	0.0	10.7	-
3.	1.5820	38.8	-	35.0	-	0.3	0.3	0.0	39.4	-	48.0	0.0	8.6	-
4.	3.3570	38.3	-	36.3	-	0.3	0.4	0.0	39.0	-	48.0	0.0	9.0	-
5.	6.8357	34.5	-	32.4	-	0.4	0.8	0.0	35.7	-	48.0	0.0	12.3	-
6.	8.6017	39.0	-	42.2	-	0.4	0.9	0.0	43.5	-	48.0	0.0	4.5	-

CALCULATION: READING + LISN FACTOR + CABLE LOSS + ATTEN.

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

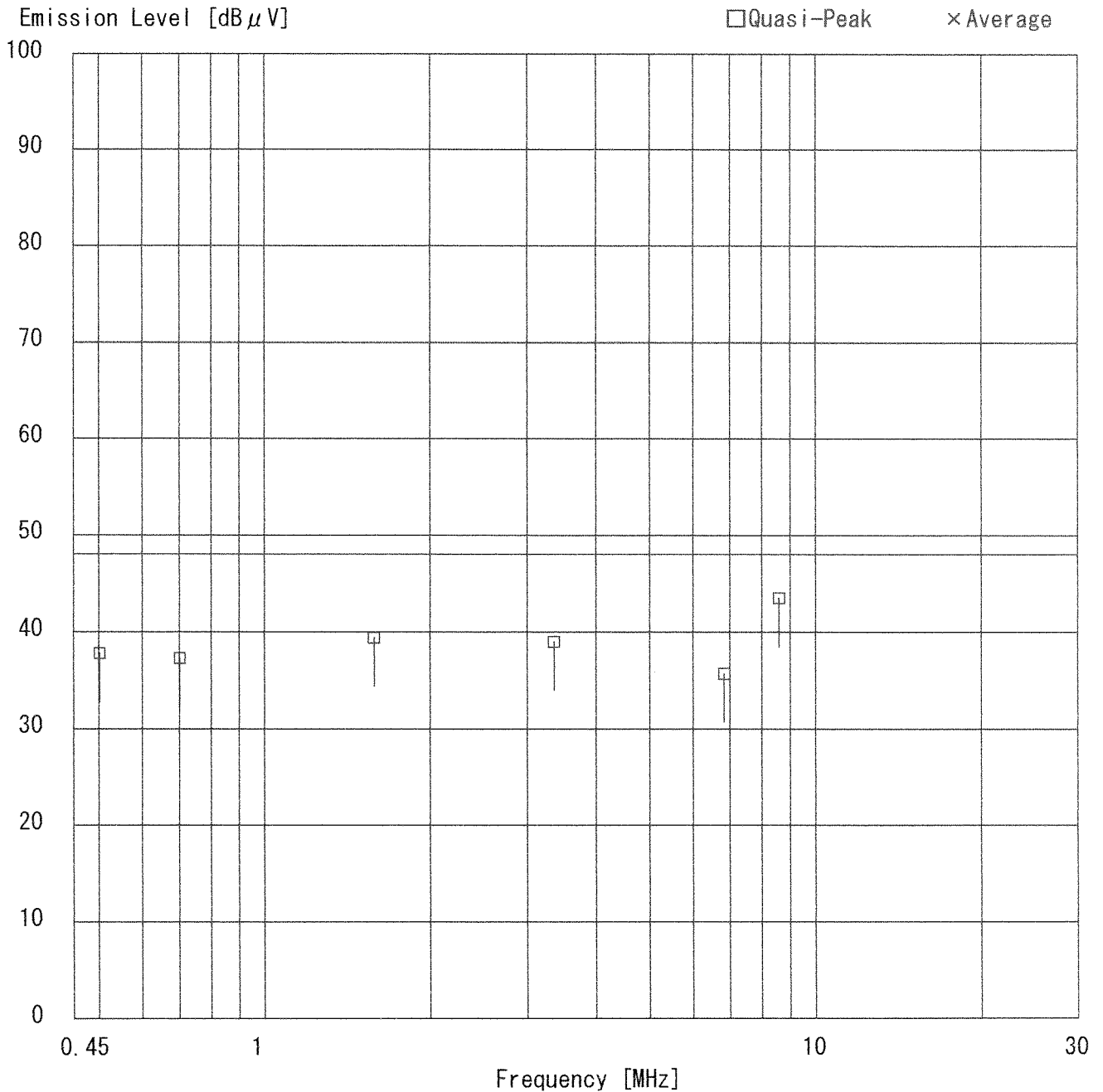
DATA OF CONDUCTION TEST

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Report No. : 21FE0012-YK-2

Applicant : Advanced Technology and Systems Co., Ltd
Kind of Equipment : RAID Subsystem
Model No. : AXRR-J764SS
Serial No. : A1DEV#2
Power : AC120V/60Hz
Mode : Random Read/Write
Remarks : AC-1
Date : 1/30/2001
Phase : Single Phase
Temperature : 20 °C
Humidity : 33 %
Regulation : FCC Part15B CLASS B

a. sato

Engineer : Akira Sato



DATA OF CONDUCTION TEST CHART

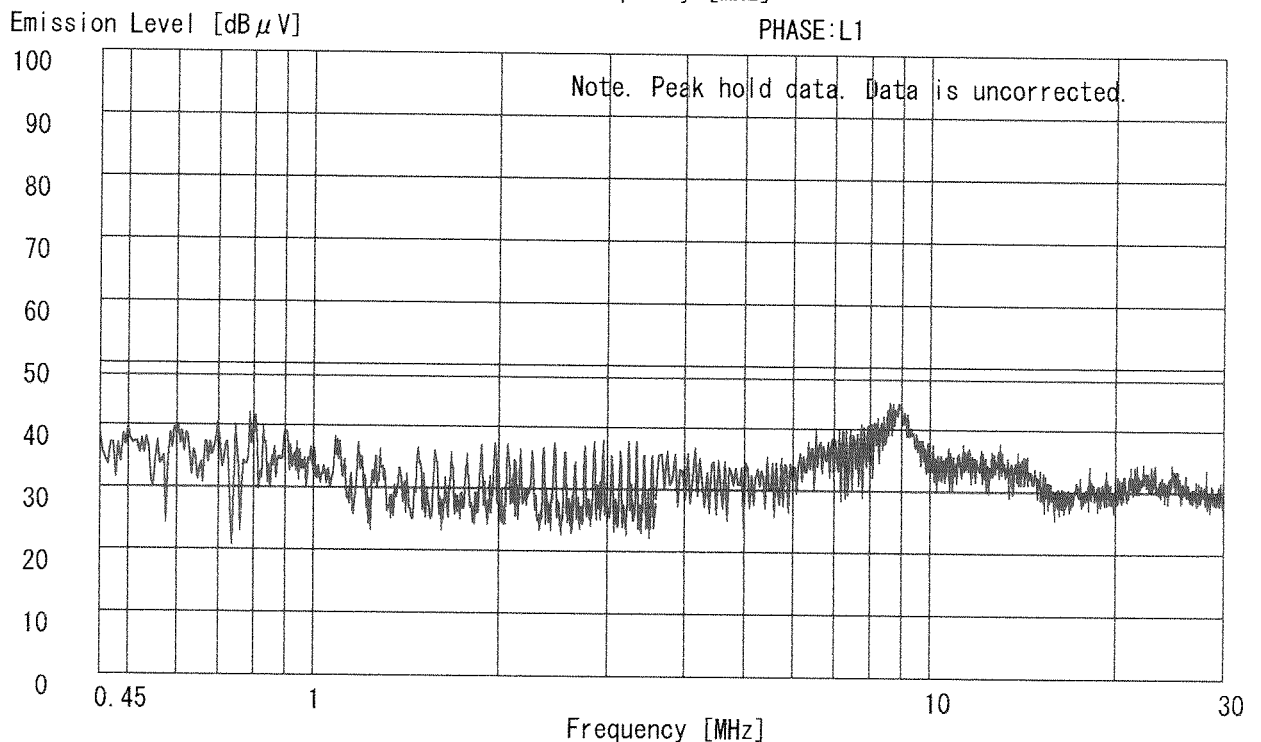
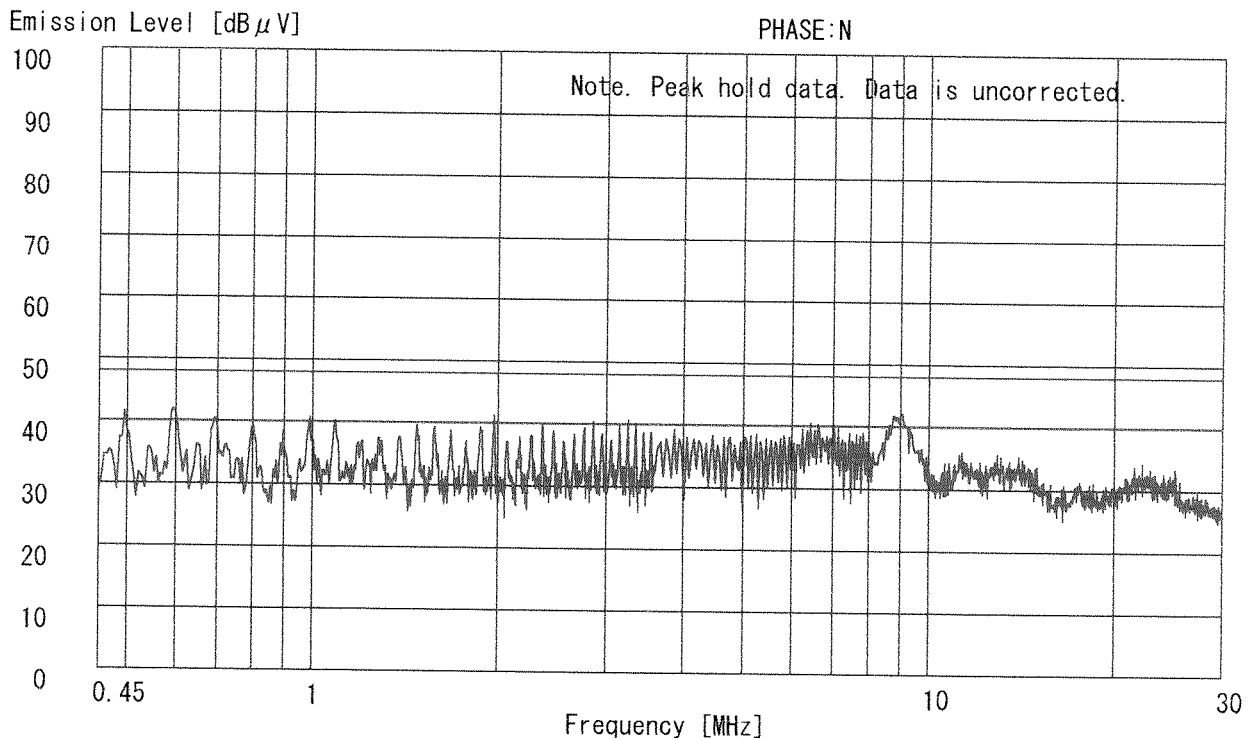
A-PEX INTERNATIONAL CO., LTD.

Yamakita No.1 Open Test Site

Report No. : 21FE0012-YK-2

Applicant : Advanced Technology and Systems Co., Ltd
Kind of Equipment : RAID Subsystem
Model No. : AXRR-J764SS
Serial No. : A1DEV#2
Power : AC120V/60Hz
Mode : Random Read/Write
Remarks : AC-1
Date : 1/30/2001
Phase : Single Phase
Temperature : 20 °C
Humidity : 33 %
Regulation 1 : FCC Part15B CLASS B
Regulation 2 : None

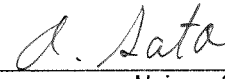
A. Sato
Engineer : Akira Sato



DATA OF CONDUCTION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.1 Open Test Site
Report No. : 21FE0012-YK-2

Applicant : Advanced Technology and Systems Co.,Ltd
Kind of Equipment : RAID Subsystem
Model No. : AXRR-J764SS
Serial No. : A1DEV#2
Power : AC120V/60Hz
Mode : Random Read/Write
Remarks : AC-2
Date : 1/30/2001
Phase : Single Phase
Temperature : 20 °C
Humidity : 33 %
Regulation : FCC Part15B CLASS B


Engineer : Akira Sato

No.	FREQ. [MHz]	READING (N)		READING (L1)		LISN FACTOR [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS		MARGIN	
		QP [dBuV]	AV	QP [dBuV]	AV				QP [dBuV]	AV	QP [dBuV]	AV	QP [dBuV]	AV
1.	0.4960	40.3	-	37.5	-	0.4	0.1	0.0	40.8	-	48.0	0.0	7.2	-
2.	0.8494	37.1	-	39.8	-	0.3	0.2	0.0	40.3	-	48.0	0.0	7.7	-
3.	1.1868	37.2	-	35.3	-	0.3	0.2	0.0	37.7	-	48.0	0.0	10.3	-
4.	2.9630	36.6	-	35.1	-	0.3	0.4	0.0	37.3	-	48.0	0.0	10.7	-
5.	6.7134	38.2	-	36.4	-	0.4	0.7	0.0	39.3	-	48.0	0.0	8.7	-
6.	8.9809	41.5	-	44.1	-	0.4	1.0	0.0	45.5	-	48.0	0.0	2.5	-

CALCULATION: READING + LISN FACTOR + CABLE LOSS + ATTEN.

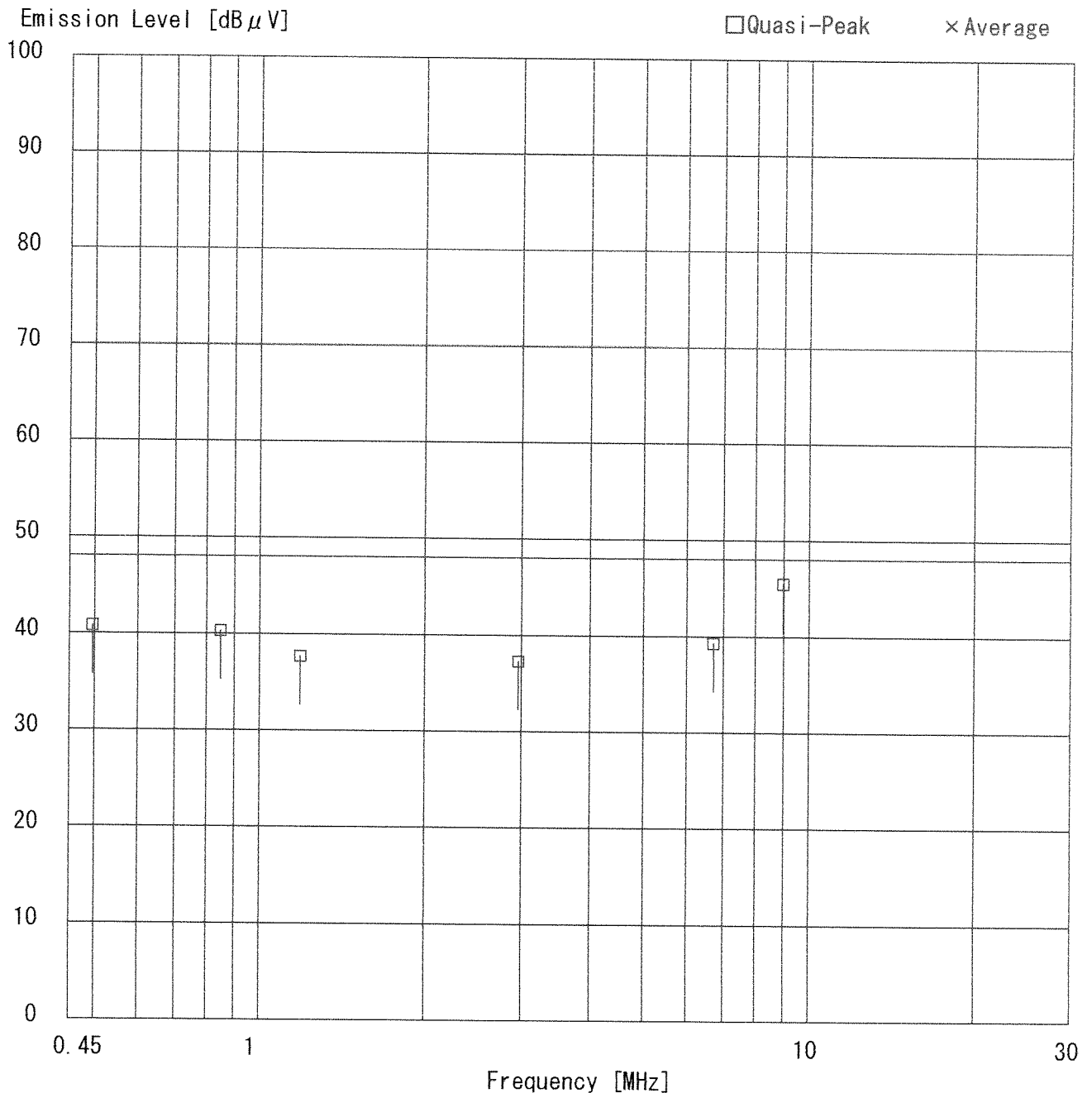
■ LISN : KLS-01 (NSLK8126) ■ COAXIAL CABLE : KCC-14/15/16/18
■ PULSE LIMITER : KPL-01 (PLO1) ■ EMI RECEIVER : KTR-02 (ESCS30)

DATA OF CONDUCTION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.1 Open Test Site
Report No. : 21FE0012-YK-2

Applicant : Advanced Technology and Systems Co., Ltd
Kind of Equipment : RAID Subsystem
Model No. : AXRR-J764SS
Serial No. : A1DEV#2
Power : AC120V/60Hz
Mode : Random Read/Write
Remarks : AC-2
Date : 1/30/2001
Phase : Single Phase
Temperature : 20 °C
Humidity : 33 %
Regulation : FCC Part15B CLASS B

a. Sato
Engineer : Akira Sato



DATA OF CONDUCTION TEST CHART

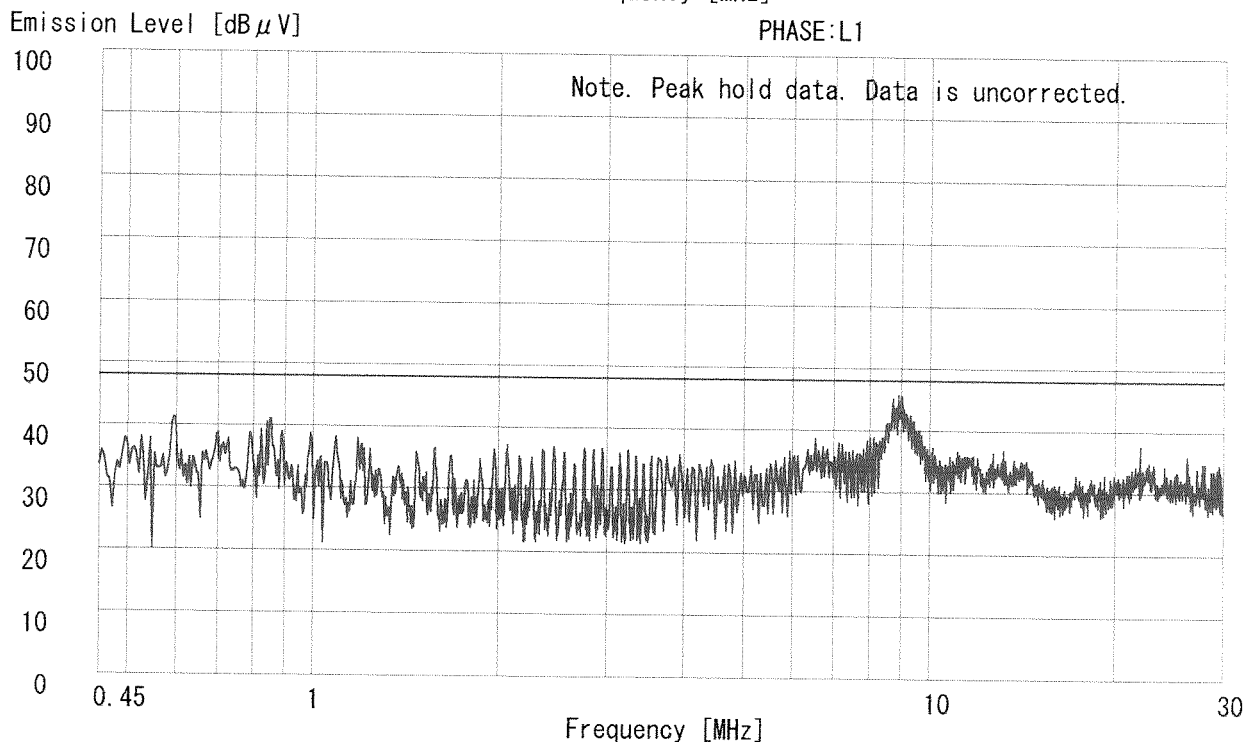
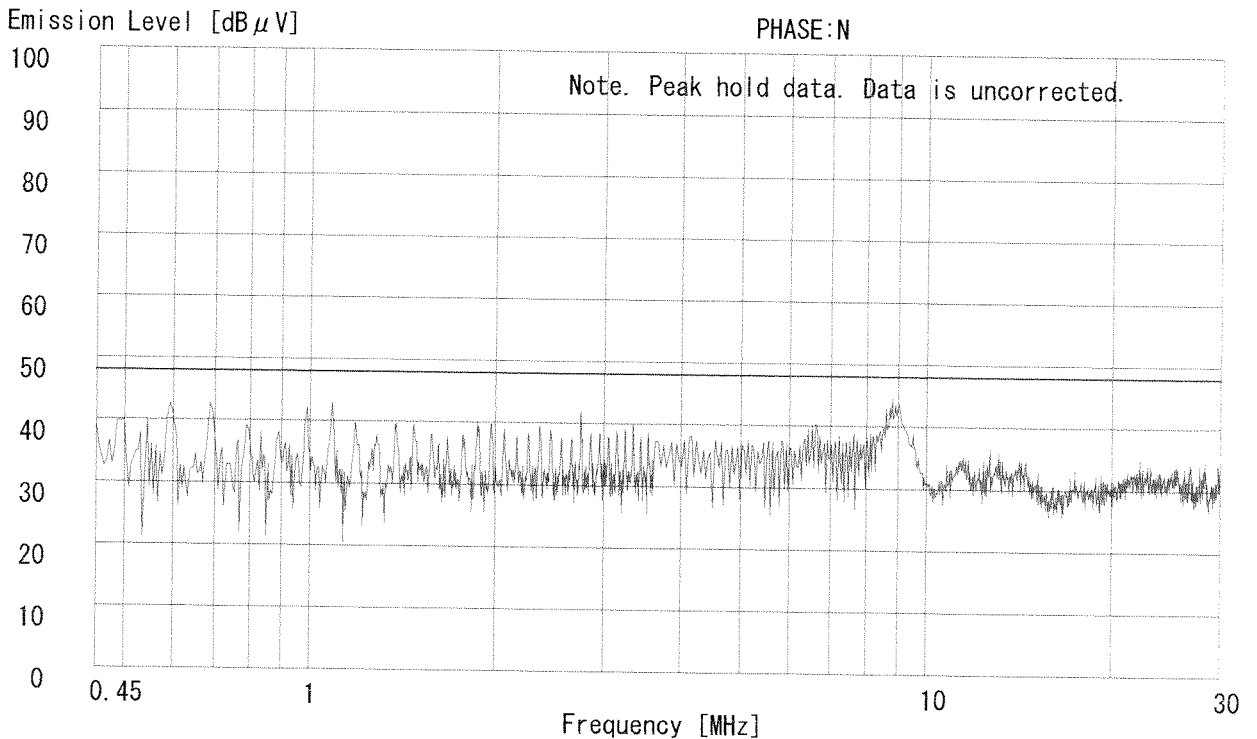
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Remarks : AC-2
Date : 1/30/2001
Phase : Single Phase
Temperature : 20 °C
Humidity : 33 %
Regulation 1 : FCC Part15B CLASS B
Regulation 2 : None

A. Sato
Engineer : Akira Sato



DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
Yamakita No.1 Open Test Site
Report No. : 21FE0012-YK-2

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Model No. : AXRR-J764SS
Serial No. : A1DEV#2
Power : AC120V/60Hz
Mode : Random Read/Write
Remarks :
Date : 1/30/2001
Test Distance : 3 m
Temperature : 17 °C
Humidity : 38 %
Regulation : FCC Part15B CLASS B

A. Sato
Engineer : Akira Sato

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	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.	43.50	BB	40.0	44.6	12.5	28.3	1.6	6.0	31.8	36.4	40.0	8.2	3.6	
2.	49.99	BB	38.4	46.5	9.8	28.3	1.7	6.0	27.6	35.7	40.0	12.4	4.3	
3.	71.36	BB	49.0	50.4	6.3	28.2	2.1	6.0	35.2	36.6	40.0	4.8	3.4	
4.	95.95	BB	50.0	49.0	10.0	28.2	2.4	6.0	40.2	39.2	43.5	3.3	4.3	
5.	192.00	BB	34.9	33.3	16.8	28.0	3.5	6.0	33.2	31.6	43.5	10.3	11.9	
6.	300.00	BB	35.7	37.2	14.5	27.6	4.6	6.1	33.3	34.8	46.0	12.7	11.2	
7.	359.98	BB	33.2	33.8	16.4	28.1	5.1	6.1	32.7	33.3	46.0	13.3	12.7	
8.	420.01	BB	29.3	33.1	17.7	28.6	5.6	6.1	30.1	33.9	46.0	15.9	12.1	

CALCULATION: READING + ANT. FACTOR + CABLE LOSS - AMP. GAIN + ATTEN.

■ ANTENNA: KBA-01 (BBA9106) 30-299.99MHz/KLA-02 (USLP9143) 300-1000MHz
■ CABLE: KCC-10/11/12/13/18 ■ PREAMP: KAF-01 (8447D) ■ EMI RECEIVER: KTR-02 (ESCS30)

DATA OF RADIATION TEST

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