

MEASUREMENT / TECHNICAL REPORT

SHARP CORPORATION

MODEL : AR-Z30PK, AR-Z31PK, AR-Z32PK
FCC ID : APYPRT0033
DATE : April 15, 1998

This report concerns(check one): Original grant ☒ Class • change _____

Equipment type: Laser Printer (ex.:computer,printer,modem,etc.)

Transition Rules Request per 15.37?

yes _____ no ☒

If no, assumed Part 15, Subpart B for unintentional radiators-the new 47 CFR
[10-1-90 Edition] provision.

Report prepared by: Name :



Katsuhiko Fukushima

Department General Manager

Quality and Reliability Control Center

Printing and Reprographic Systems Group

Company name : SHARP CORPORATION

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639-1186 Japan

Phone number : (0743) 55-4380

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TEST CONFIGURATION
(RADIATION AND CONDUCTION MEASUREMENT)

1. Host & Peripheral Devices

A) Personal Computer (Host)

Model No.	:	BA0WW
Serial No.	:	TA722P0445
FCC ID	:	AO9-AXXAA
Brand	:	digital

B) Color Monitor

Model No.	:	P1528JB
Serial No.	:	45921A2L0344
FCC ID	:	BGB SD5561C
Brand	:	DELL Computer

C) Keyboard

Model No.	:	RT6656TWJP
Serial No.	:	41071518
FCC ID	:	AQ6-MTN4C15
Brand	:	digital

D) Mouse

Model No.	:	30-46117-02
Serial No.	:	LC71505839
FCC ID	:	DZL211029
Brand	:	digital

E) Modem

Model No.	:	33.6
Serial No.	:	0005491
FCC ID	:	FCZ503450125
Brand	:	Supra Express

- Continued -

F) Shielded Cables

1. Parallel Interface Cable : Length 1.80m

2. Video I/F Cable : Length 1.80m

[This Cable is packaged and
marketed with the Color Monitor]

3. AC Power Cable for the Color Monitor : Length 2.00m

4. AC Power Cable : Length 2.00m
for the Personal Computer

G) Non-Shielded Cables

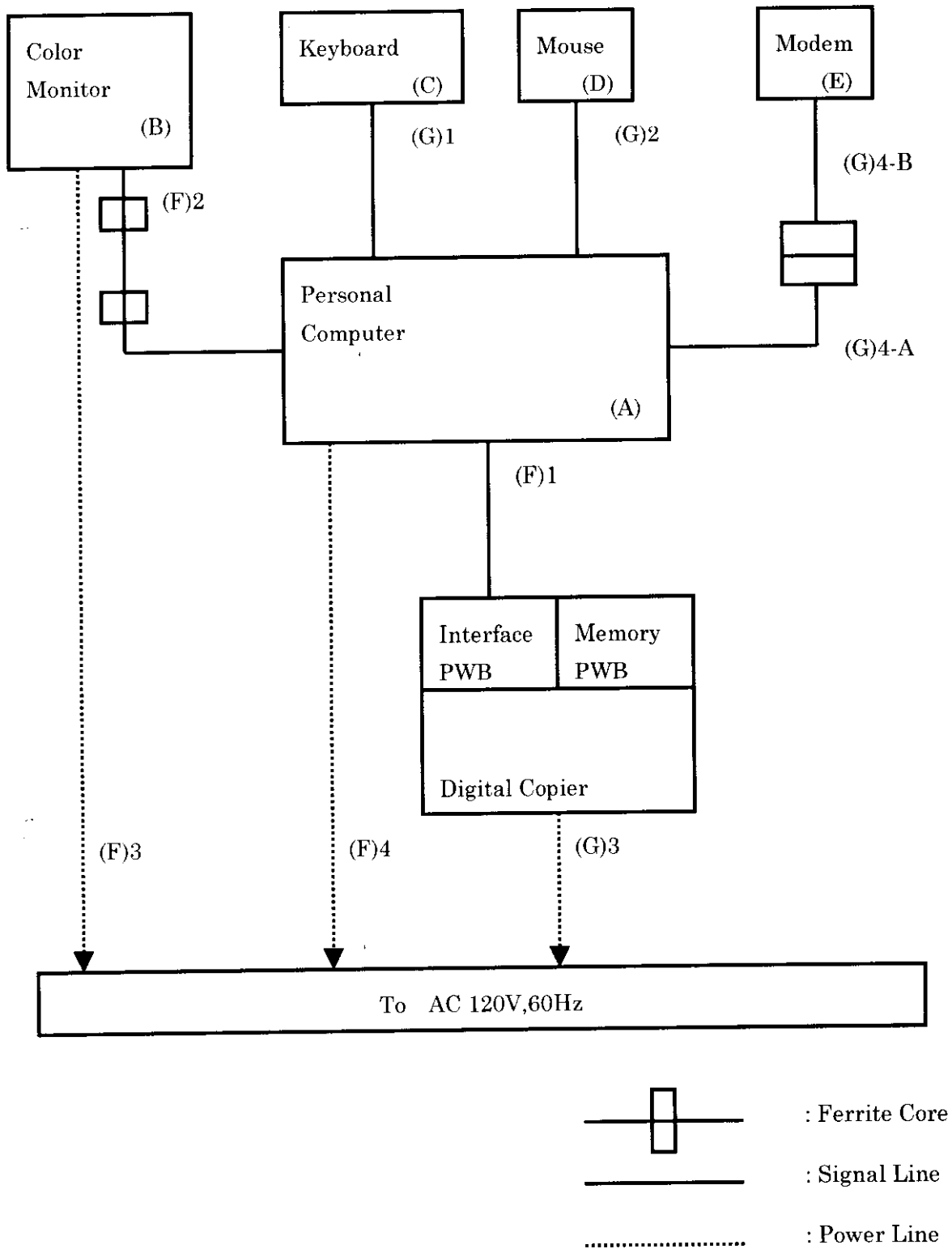
1. Keyboard Cable : Length 2.00m

2. Mouse Cable : Length 1.80m

3. AC Power Cable for the Digital Copier : Length 1.80m

4. Modem Cable A : Length 1.80m

Cable B : Length 1.75m

TEST DIAGRAM

2. Test Operation

- (1) Turn on the EUT.
- (2) Turn on the other devices.
After a while, start Windows on the personal computer.
- (3) Open **WordPad** by **Accessories**.
- (4) Select **Open** by **File**, and open **hprint.doc** file.
- (5) Select **Print** by **File**.
- (6) The number of pages to be printed, then select **OK**.
“H” print is started.

[illegible]

RADIATION MEASUREMENT (FCC 15.109)

1. Measurement Site

Sharp Corporation Information Systems Group

Shielded Anechoic Chamber

Nara, Japan

(note) This Shielded Anechoic Chamber and Measurement Facilities has been filed with FCC.

(31040/SIT 1300F2, dated March 26, 1998)

2. Date of Measurement

April 12, 1998

3. Measurement Engineer

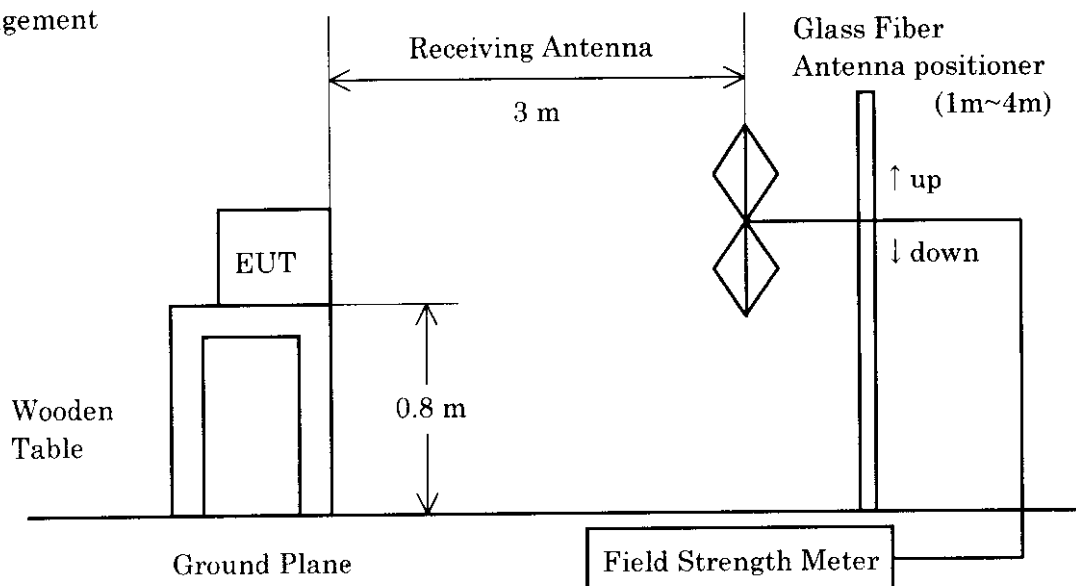
Name M. Kosaka

Section Quality and Reliability Control Center
Printing and Reprographic Systems Group

4. Measurement Methods and Test Procedures

FCC Procedure for Measuring RF Emissions from Computing Devices,
FCC/ANSI C63.4-1992 .

5. Test Arrangement



6. Operation Mode of Field Strength Meter

Detector Function CISPR Quasi-Peak

6dB Bandwidth 120kHz



7. Test Result

Spectrum was scanned from 30MHz to 1000MHz.

.. Followings data are measured when each emission is maximized, and its level is within 10 dB below the Limit.

STAND-BY MODE				
Frequency (MHz)	Ant Pol H/V	Correction Factor(dB)	Meter Reading (dB μ V)	Field Strength (dB μ V/m)
30.000	H	-7.2	26.1	18.9
137.620	H	-10.2	47.2	37.0
157.296	H	-8.4	46.9	38.5
176.009	H	-8.3	47.5	39.2
200.429	H	-6.8	35.7	28.9
308.743	H	-5.4	31.9	26.5
668.173	H	0.5	35.9	36.4
30.000	V	-7.2	34.6	27.4
38.074	V	-10.1	32.9	22.8
88.015	V	-16.9	51.7	34.8
137.612	V	-10.2	47.5	37.3
153.998	V	-8.6	47.8	39.2
452.182	V	-4.1	33.0	28.9
735.010	V	1.1	37.9	39.0

(Note) • Correction Factor includes Antenna Factor, Cable Loss and Pre-amplifier Gain.

Sample Calculation

735.010 MHz Vertical Polarization

$$37.9 + (+1.1) = 39.0 \text{ (dB}\mu\text{V/m)}$$

Regulation Limits

30 ~ 88MHz 100 μ V/m (40.0dB μ V/m)

88 ~ 216MHz 150 μ V/m (43.5dB μ V/m)

216 ~ 960MHz 200 μ V/m (46.0dB μ V/m)

960MHz ~ 500 μ V/m (53.9dB μ V/m)

(Measuring distance is 3m)

Test Result

Spectrum was scanned from 30MHz to 1000MHz.

Followings data are measured when each emission is maximized, and its level is within 10 dB below the Limit.

COPY MODE				
Frequency (MHz)	Ant Pol H/V	Correction Factor(dB)	Meter Reading (dBμV)	Field Strength (dBμV/m)
30.000	H	-7.2	37.0	29.8
66.008	H	-18.2	47.2	29.0
117.966	H	-11.2	47.7	36.5
137.629	H	-10.2	48.8	38.6
165.013	H	-8.4	47.5	39.1
201.511	H	-6.9	33.4	26.5
526.509	H	-2.6	22.8	20.2
668.173	H	0.5	36.6	37.1
30.000	V	-7.2	36.7	29.5
38.162	V	-10.1	36.4	26.3
88.022	V	-16.9	49.5	32.6
128.711	V	-10.8	46.0	35.2
137.618	V	-10.2	48.6	38.4
201.516	V	-6.9	34.2	27.3
507.210	V	-3.2	27.4	24.2
668.116	V	0.5	39.7	40.2

(Note) ·Correction Factor includes Antenna Factor, Cable Loss and Pre-amplifier Gain.

Sample Calculation

137.629 MHz Horizontal Polarization

$$48.8 + (-10.2) = 38.6 \text{ (dBμV/m)}$$

Regulation Limits

30 ~ 88MHz 100μV/m (40.0dBμV/m)

88 ~ 216MHz 150μV/m (43.5dBμV/m)

216 ~ 960MHz 200μV/m (46.0dBμV/m)

960MHz ~ 500μV/m (53.9dBμV/m)

(Measuring distance is 3m)

Test Result

Spectrum was scanned from 30MHz to 1000MHz.

Followings data are measured when each emission is maximized, and its level is within 10 dB below the Limit.

SCAN MODE				
Frequency (MHz)	Ant Pol H/V	Correction Factor(dB)	Meter Reading (dBμV)	Field Strength (dBμV/m)
30.000	H	-72	26.0	18.8
38.347	H	-10.1	37.2	27.1
77.006	H	-18.6	53.6	35.0
137.627	H	-10.2	48.3	38.1
165.022	H	-8.4	38.9	30.5
198.002	H	-6.9	37.5	30.6
308.673	H	-5.4	34.1	28.7
668.206	H	0.5	37.0	37.5
30.000	V	-7.2	34.2	27.0
38.362	V	-10.1	43.7	33.6
88.015	V	-16.9	50.6	33.7
137.622	V	-10.2	47.0	36.8
154.000	V	-8.6	44.3	35.7
451.024	V	-4.2	41.2	37.0
734.995	V	1.1	38.1	39.2

(Note) • Correction Factor includes Antenna Factor, Cable Loss and Pre-amplifier Gain.

Sample Calculation

77.006 MHz Horizontal Polarization

$$53.6 + (-18.6) = 35.0 \text{ (dBμV/m)}$$

Regulation Limits

30 ~ 88MHz 100μV/m (40.0dBμV/m)

88 ~ 216MHz 150μV/m (43.5dBμV/m)

216 ~ 960MHz 200μV/m (46.0dBμV/m)

960MHz ~ 500μV/m (53.9dBμV/m)

(Measuring distance is 3m)

Test Result

Spectrum was scanned from 30MHz to 1000MHz.

Followings data are measured when each emission is maximized, and its level is within 10 dB below the Limit.

PRINT MODE				
Frequency (MHz)	Ant Pol H/V	Correction Factor(dB)	Meter Reading (dBμV)	Field Strength (dBμV/m)
30.000	H	-7.2	36.0	28.8
88.017	H	-16.9	41.3	24.4
118.024	H	-11.2	48.2	37.0
137.613	H	-10.2	48.6	38.4
157.969	H	-8.4	43.8	35.4
197.499	H	-6.9	45.7	38.8
308.024	H	-5.4	42.4	37.0
668.182	H	0.5	33.4	33.9
30.000	V	-7.2	34.2	27.0
88.015	V	-16.9	49.5	32.6
110.008	V	-12.8	43.2	30.4
137.642	V	-10.2	48.8	38.6
154.010	V	-8.6	45.9	37.3
201.520	V	-6.9	35.3	28.4
634.795	V	0.2	29.5	29.7

(Note) Correction Factor includes Antenna Factor, Cable Loss and Pre-amplifier Gain.

Sample Calculation

157.969 MHz Horizontal Polarization

$$43.8 + (-8.4) = 35.4 \text{ (dBμV/m)}$$

Regulation Limits

30 ~ 88MHz 100μV/m (40.0dBμV/m)

88 ~ 216MHz 150μV/m (43.5dBμV/m)

216 ~ 960MHz 200μV/m (46.0dBμV/m)

960MHz ~ 500μV/m (53.9dBμV/m)

(Measuring distance is 3m)

CONDUCTION MEASUREMENT (FCC 15.107)

1. Measurement Site

Sharp Corporation Information Systems Group

Shielded Room

Nara, Japan

(Note) This Measurement Facilities has been filed with FCC

(same as Shielded Anechoic Chamber).

(31040/SIT 1300F2, dated May. 29, 1997)

2. Date of Measurement

April 12, 1998

3. Measurement Engineer

Name M.Kosaka

Section Quality and Reliability Control Center

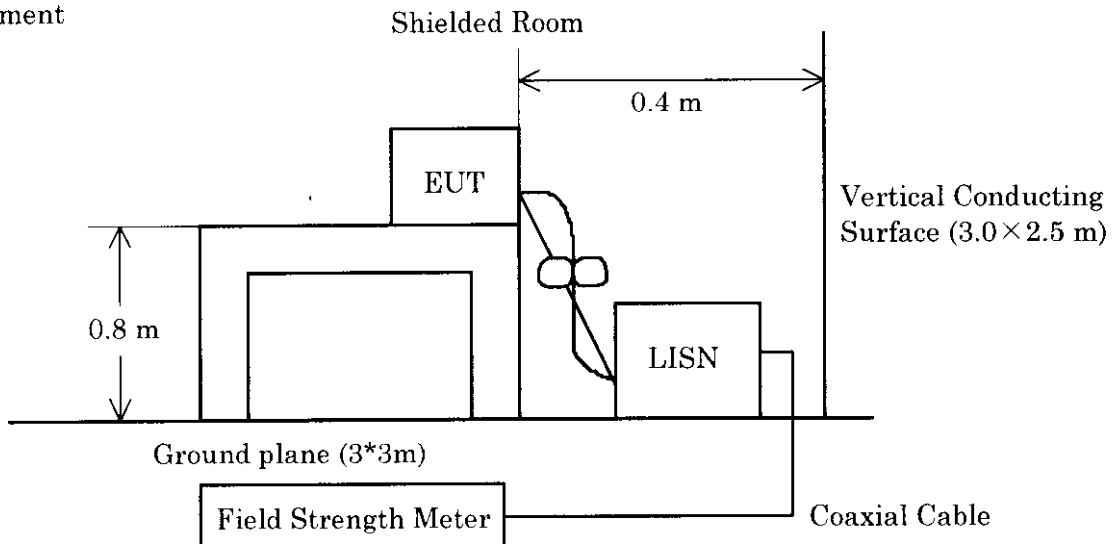
Printing and Reprographic Systems Group

4. Measurement Methods and Test Procedures

FCC Procedure for Measuring RF Emissions from Computing Devices,

FCC/ANSI C63.4-1992.

5. Test Arrangement



6. Operation Mode of Field Strength Meter

Detector Function CISPR Quasi-Peak/Average

6dB Bandwidth 9kHz

7. Test Result

Spectrum was scanned from 450kHz to 30MHz.

Followings data are measured when each emission is maximized, and its level is within 10 dB below the Limit.

STAND-BY MODE						
Frequency (MHz)	Correction Factor (dB)	QP Or AV	Meter Reading (dB μ V)		RF Voltage (dB μ V)	
			One end -Ground	Other end -Ground	One end -Ground	Other end -Ground
0.4924	0.2	QP	41.7	34.6	41.9	34.8
0.4924	0.2	AV	10.6	6.6	10.8	6.8
0.7385	0.3	QP	35.1	30.3	35.4	30.6
0.7385	0.3	AV	8.8	4.0	1.1	4.3
1.0233	0.4	QP	34.7	33.1	35.1	33.5
1.0233	0.4	AV	9.4	8.9	9.8	9.3
4.1061	0.9	QP	40.7	39.9	41.6	40.8
4.1061	0.9	AV	13.5	12.9	14.4	13.8
11.1052	1.7	QP	38.2	38.9	39.9	40.6
11.1052	1.7	AV	4.4	4.3	6.1	6.0
17.4300	2.3	QP	40.4	40.1	42.7	42.4
17.4300	2.3	AV	10.2	10.2	12.5	12.5
26.2144	2.9	QP	44.6	44.3	47.5	47.2
26.2144	2.9	AV	34.2	33.6	37.1	36.5

(Note) Correction Factor includes LISN Factor and Cable Loss.

Sample Calculation

11.1052 MHz One end -Ground (QP Mode)

$$38.2 + 1.7 = 39.9 \text{ (dB}\mu\text{V)}$$

Regulation Limits

0.45MHz ~ 30MHz

250 μ V (48.0dB μ V)

Test Result

~ Spectrum was scanned from 450kHz to 30MHz.

Followings data are measured when each emission is maximized, and its level is within 10 dB below the Limit.

COPY MODE						
Frequency (MHz)	Correction Factor (dB)	QP or AV	Meter Reading (dB μ V)		RF Voltage (dB μ V)	
			One end -Ground	Other end -Ground	One end -Ground	Other end -Ground
0.4650	0.2	QP	37.2	42.1	37.4	42.3
0.4650	0.2	AV	5.7	5.5	5.9	5.7
0.6032	0.3	QP	32.5	36.0	32.8	39.3
0.6032	0.3	AV	6.0	5.2	6.3	5.5
0.6574	0.3	QP	37.6	36.7	37.9	37.0
0.6574	0.3	AV	3.2	4.6	3.5	4.9
11.0293	1.7	QP	38.4	38.7	40.1	40.4
11.0293	1.7	AV	10.8	11.1	12.5	12.8
20.0383	2.4	QP	36.8	38.9	39.2	41.3
20.0383	2.4	AV	10.4	13.5	12.8	15.9
26.2138	2.9	QP	43.2	43.1	46.1	46.0
26.2138	2.9	AV	14.9	18.2	17.8	21.1

(Note) Correction Factor includes LISN Factor and Cable Loss.

Sample Calculation

26.218 MHz One end –Ground (QP Mode)

$$43.2 + 2.9 = 46.1 \text{ (dB}\mu\text{V)}$$

Regulation Limits

0.45MHz ~ 30MHz 250 V (48.0dB μ V)

Test Result

Spectrum was scanned from 450kHz to 30MHz.

Followings data are measured when each emission is maximized, and its level is within 10 dB below the Limit.

SCAN MODE						
Frequency (MHz)	Correction Factor (dB)	QP or AV	Meter Reading (dB μ V)		RF Voltage (dB μ V)	
			One end -Ground	Other end -Ground	One end -Ground	Other end -Ground
0.5287	0.4	QP	31.2	36.8	31.6	37.2
0.5287	0.4	AV	10.6	6.6	11.0	7.0
0.6140	0.3	QP	36.3	33.2	36.6	33.5
0.6140	0.3	AV	5.2	3.3	5.5	3.6
4.2876	0.9	QP	37.8	35.9	38.7	36.8
4.2876	0.9	AV	5.6	10.2	6.5	11.1
11.0136	1.7	QP	38.1	37.4	39.8	39.1
11.0136	1.7	AV	5.6	7.8	7.3	9.5
20.2470	2.4	QP	36.3	33.2	38.7	35.6
20.2470	2.4	AV	7.1	6.6	9.5	9.0
26.2140	2.9	QP	45.2	44.6	45.2+2.9-13.0=35.1	47.5
26.2140	2.9	AV	35.3	32.8	38.2	35.7

(Note) Correction Factor includes LISN Factor and Cable Loss.

Sample Calculation

11.0136 MHz Other end –Ground (QP Mode)

$$37.4 + 1.7 = 39.1 \text{ (dB}\mu\text{V)}$$

Regulation Limits

0.45MHz ~ 30MHz 250 V (48.0dB μ V)

Test Result

Spectrum was scanned from 450kHz to 30MHz.

Followings data are measured when each emission is maximized, and its level is within 10 dB below the Limit.

PRINT MODE						
Frequency (MHz)	Correction Factor (dB)	QP or AV	Meter Reading (dB μ V)		RF Voltage (dB μ V)	
			One end -Ground	Other end -Ground	One end -Ground	Other end -Ground
0.4650	0.2	QP	43.2	42.9	43.4	43.1
0.4650	0.2	AV	14.9	12.7	15.1	12.9
0.5362	0.4	QP	36.3	38.6	36.7	39.0
0.5362	0.4	AV	5.2	3.3	5.9	3.7
0.6174	0.3	QP	37.6	36.3	37.9	36.6
0.6174	0.3	AV	6.8	12.6	7.1	12.9
3.5215	0.7	QP	38.2	36.4	38.9	37.1
3.5215	0.7	AV	10.3	6.4	11.0	7.1
12.0851	1.8	QP	37.0	35.0	38.8	36.8
12.0851	1.8	AV	10.1	10.5	11.9	12.3
21.1457	2.5	QP	31.2	33.6	33.7	36.1
21.1457	2.5	AV	7.1	5.2	9.6	7.7

(Note) Correction Factor includes LISN Factor and Cable Loss.

Sample Calculation

0.6174 MHz Other end -Ground (QP Mode)

$$36.3 + 0.3 = 36.6 \text{ (dB}\mu\text{V)}$$

Regulation Limits

0.45MHz ~ 30MHz 250 V (48.0dB μ V)

LIST OF TEST EQUIPMENT

(a) Field Strength Meter

Model No	ESVS 10
Manufacturer	Rohde & Schwarz
Serial No	846285/005
Frequency Range	20MHz~1000MHz
Operation Mode	CISPR Pub 16 Band C & D

(b) Field Strength Meter

Model No.	ESH3
Manufacturer	Rohde & Schwarz
Serial No.	872742/001
Frequency Range	9kHz~30MHz
Operation Mode	CISPR Pub 16 Band A & B

(c) Double Cone Antenna (biconical antenna)

Model No.	VHA9103 + BBA9106
Manufacturer	Schwarzbeck
Frequency Range	30MHz~300MHz

(d) Logarithmic-Periodic Antenna

Model No.	UHALP9107
Manufacturer	Schwarzbeck
Frequency Range	300MHz~1000MHz

(e) Line Impedance Stabilization Network

Model No.	KNW407
Manufacturer	Kyouritsu Electrical Works
Frequency Range	150kHz~30MHz
Specification	50 Ω , 50 μ H
Rated Capacity	250V, 15A