

**EPSON**

SEIKO EPSON CORPORATION

FCC ID : BKMFBP922A

***RFI MEASUREMENT TEST REPORT***

***FCC PART 15B CLASS B***

\*\*\*\*\* CLASS B PERSONAL COMPUTERS AND PERIPHERALS \*\*\*\*\*

APPLICANT : SEIKO EPSON CORPORATION

EQUIPMENT : PRINTER

TRADE NAME : EPSON

MODEL NUMBER : P922A

FCC ID NUMBER : BKMFBP922A

TEST REPORT No. : E-103-98331

**NVLAP<sup>®</sup>**

NVLAP LAB CODE 200157-0

Test Report

SEIKO EPSON CORPORATION

## TEST CERTIFICATION

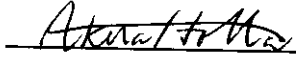
### Applicant Information

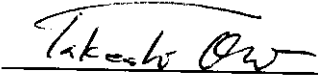
Company : SEIKO EPSON Corporation  
Division/Section : TP Product Safety Design Group  
Imaging & Information Products Operations  
Address : 80, Harashinden, Hirooka, Shiojiri-shi, Nagano, 399-0785 Japan  
PHONE : +81-263-53-6024 FAX : +81-263-53-3544


### Test Performed

Company : SEIKO EPSON Corporation  
Division/Section : EMC Group, CS/Quality Assurance Office  
Location : 80, Harashinden, Hirooka, Shiojiri-shi, Nagano, 399-0785 Japan  
PHONE: +81-263-52-5094 FAX : +81-263-54-5806  
10 meter Semi-anechoic Chamber  
FCC File No. : 31040 / SIT 1300F2  
NVLAP Lab Code : 200157-0

Test started : 28 October, 1998  
Test completed : 29 October, 1998  
Purpose of test : Compliance with standards  
Test specification(s) : FCC Part 15B Class B (Unintentional Radiators)  
Test procedure(s) : ANSI C63.4-1992

Test engineer : Akira Hotta   
EMC group, CS/Quality Assurance Office

Report checked by : Takeshi Ono   
Chief Engineer, EMC group, CS/Quality Assurance Office

Report approved by : Yoshiyuki Sakurai   
Manager, EMC group, CS/Quality Assurance Office, NVLAP signatory

Report issue date : 5 November, 1998

The test item under the test conditions and configuration shown in this test report complies with above standard.

**EPSON**

SEIKO EPSON CORPORATION

**1-2 Auxiliary equipment (AE)**

AE	Name	Model (Serial number)	Manufacturer	FCC ID	Voltage input Power consumption	
1	Cut sheet feeder	C80684 (000043)	SEIKO EPSON Corp.	N/A	DC 35 V 900 mA DC 5.0 V 170 mA	a)
2	Serial I/F card	C82307 (N/A)	SEIKO EPSON Corp.	BKMC82307	DC 5.0 V 160 mA	a)
3	Personal computer	D6530-WJ101 (SG83801728)	Hewlett-Packard	N/A (DoC)	AC 120 V/ 60 Hz 6.0 A	
4	CRT monitor	D2825 (MY83033379)	Hewlett-Packard	JVP7154E	AC 120 V/ 60 Hz 2.0 A	
5	Keyboard	SK-2502 (M980900357)	Hewlett-Packard	GYUR41SK	DC 5.0 V 60 mA	b)
6	Mouse	M-S34 (LZM82377061)	Hewlett-Packard	DZL211029	DC 5.0 V 15 mA	b)
7	Printer	P850A (1YLY185764)	SEIKO EPSON Corp.	BKMP850A	AC 120 V/ 60 Hz 1.0 A	

a) EUT option

b) Supplied from AE3

SEIKO EPSON CORPORATION

### 1-3 Relevant Signal and Power lines

AE = Auxiliary equipment, EUT = Equipment Under Test = Test item

Line	Name	From	To	Length	Shield	Remarks
1	Parallel I/F cable	EUT Parallel in / AE7 Parallel in	AE3 Parallel out	2.0 m	Yes	Metal connector
2	Serial I/F cable	AE7 Serial in / EUT Serial in	AE3 Serial out	2.0 m	Yes	Metal connector
3	Serial I/F cable	AE2 Serial in	AE3 Serial out	2.0 m	Yes	Metal connector
4	Cut sheet feeder I/F	AE1 Signal in	EUT Signal out	0.3 m	Yes	Metal connector
5	Video I/F cable	AE4 Video in	AE3 Video out	1.4 m	Yes	Metal connector
6	Keyboard I/F cable	AE5 Keyboard	AE3 Keyboard out	1.8 m	Yes	Metal connector
7	Mouse I/F cable	AE6 Mouse	AE3 Mouse out	1.8 m	Yes	Metal connector
8	Printer AC cable	EUT AC 120 V	Main AC 120 V	2.0 m	No	
9	Computer AC cable	AE3 AC 120 V	Main AC 120 V	2.2 m	No	
10	CRT AC cable	AE4 AC 120 V	Main AC 120 V	2.0 m	No	
11	Printer AC cable	AE7 AC 120 V	Main AC 120 V	2.0 m	No	

Note : Line 4 (Cut sheet feeder I/F) has a ferrite core permanently attached.

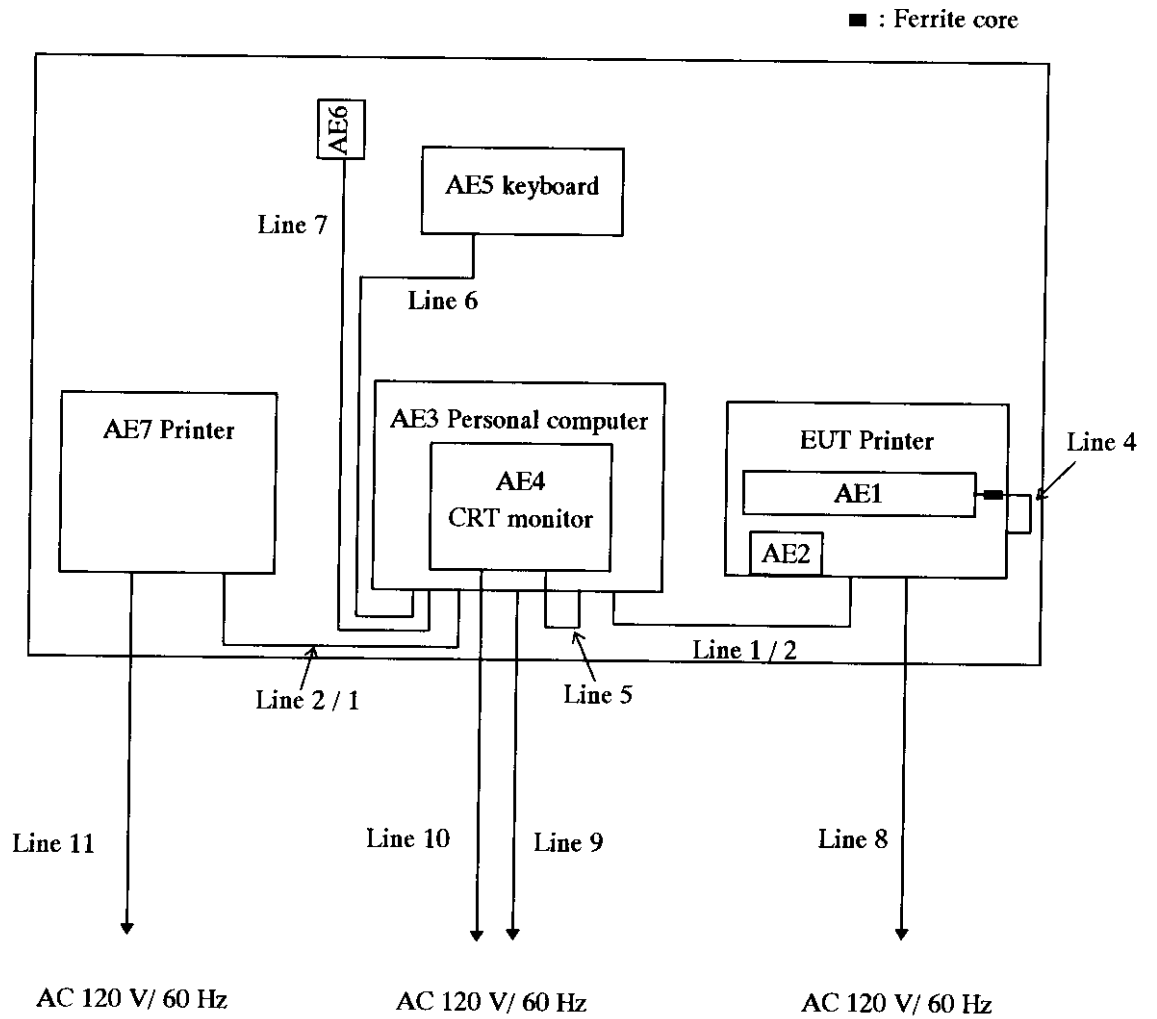
# EPSON

SEIKO EPSON CORPORATION

## 1-4 Positioning of Equipment

### Configuration 1

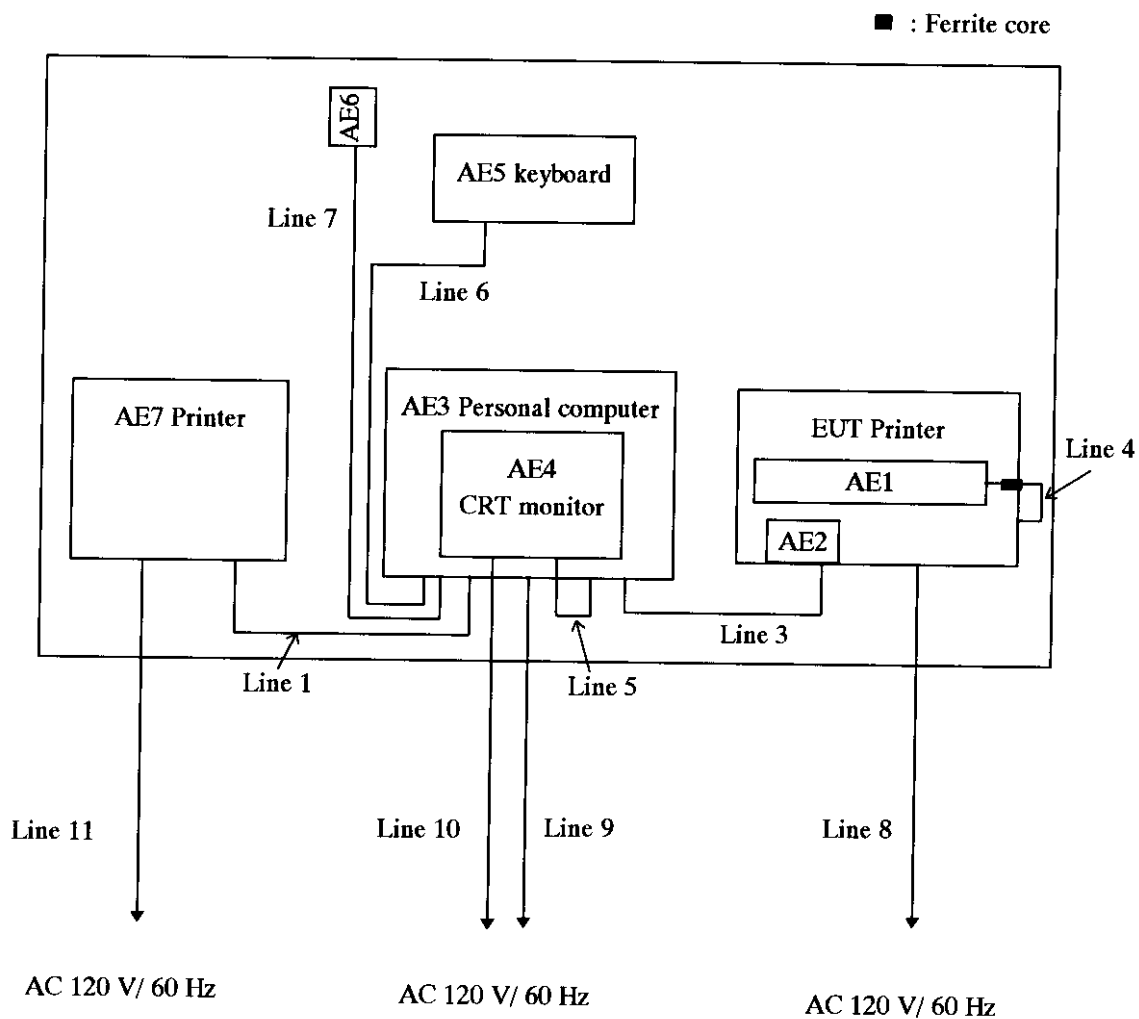
Testing table top view



Abbreviations shown in the above diagram correspond to equipment or cables in tables in Section 1-1, 1-2, 1-3.

Configuration 2

Testing table top view



Abbreviations shown in the above diagram correspond to equipment or cables in tables in Section 1-1, 1-2, 1-3.

# EPSON

SEIKO EPSON CORPORATION

## 2. OPERATING CONDITIONS

The EUT has been operated under the following conditions during the tests.

### 2-1 Operating modes

#### Mode 1 : Parallel interface

The EUT continuously prints character 'H' via the parallel interface (line 1) with below operating cycles in configuration 1.

#### Mode 2 : Serial interface

The EUT continuously prints character 'H' via the serial interface (line 2) with below operating cycles in configuration 1.

#### Mode 3 : Option serial interface

The EUT continuously prints character 'H' via the option serial interface (line 3) with below operating cycles in configuration 2.

### 2-2 Operating cycles

Performed following operation continuously.

- 1: The Data transferred from computer(AE3)
- 2: 'H' characters printed by EUT
- 3: 'H' characters displayed on the full screen of monitor (AE4)

Note : The data transfer rate on the serial I/F(RS-232C) and option serial I/F(RS-232 C) is 9600 bps.



SEIKO EPSON CORPORATION

FCC ID : BKMFBP922A

### 3. TEST PROCEDURE(S)

These tests have been carried out with the test procedure(s) drawn up by our laboratory based on the following test procedure(s).

Test Item	Test procedure used	Scanned Frequency Range
Conducted Emission	ANSI C63.4 - 1992	0.45 - 30 MHz
Radiated Emission	ANSI C63.4 - 1992	30 - 1000 MHz





SEIKO EPSON CORPORATION

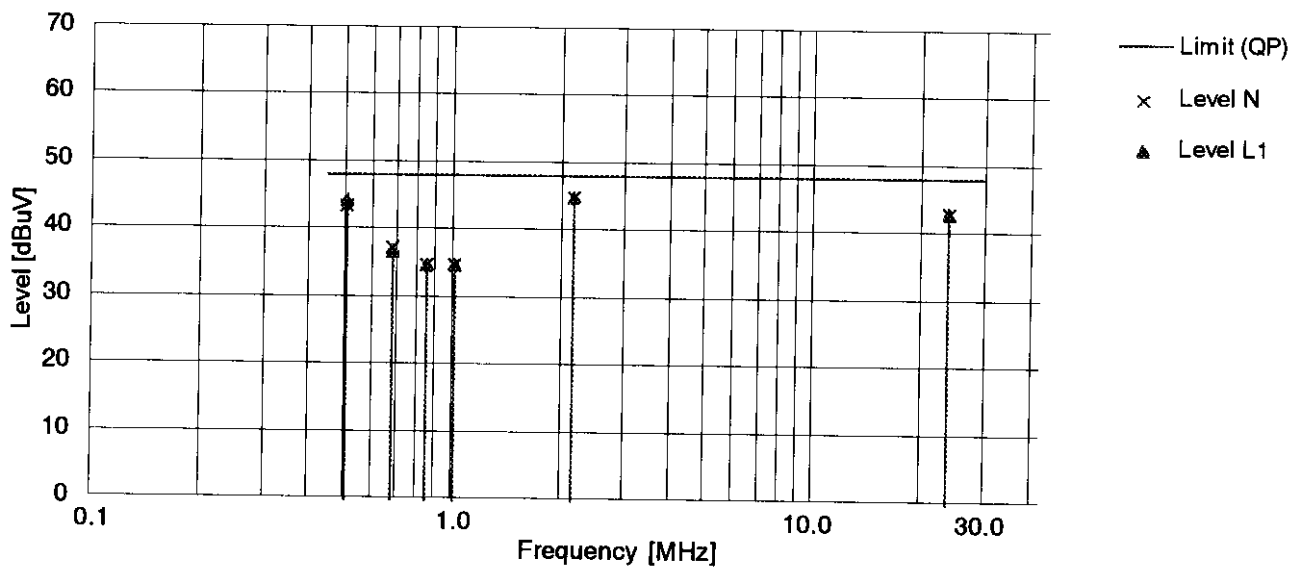
### 4. EVALUATION OF TEST RESULTS

#### 4-1 Conducted Emission Test

##### Mode 1 : Parallel interface

Kind of Equipment	: Printer	Temperature	: 20 °C
Model Name	: P922A	Humidity	: 50 %
Serial No.	: 22GN000041	Engineer	: A. Hotta
Comment	: Parallel I/F		
Detector	: QP	Date	: 98/10/29
Points	: 6	EMI Receiver(s)	: R/S ESH 2

Limit : [ FCC ] Class B



Frequency [MHz]	Reading N		Reading L1		QP-AVE [dB]	QP/AVE -13 [dB]	Correction Factor [dB]	Level N [dBuV]	Level L1 [dBuV]	Limit [dBuV]	Margin [dB]
	QP [dBuV]	AVE [dBuV]	QP [dBuV]	AVE [dBuV]							
0.5123	43.0	-	44.0	-	-	-	0.2	43.2	44.2	48.0	3.8
0.6850	37.0	-	36.5	-	-	-	0.2	37.2	36.7	48.0	10.8
0.8539	34.5	-	34.5	-	-	-	0.2	34.7	34.7	48.0	13.3
1.0232	34.5	-	34.5	-	-	-	0.2	34.7	34.7	48.0	13.3
2.1771	44.5	-	44.5	-	-	-	0.2	44.7	44.7	48.0	3.3
23.7925	41.5	-	41.5	-	-	-	1.3	42.8	42.8	48.0	5.2

Note :All other frequencies in the range from 450 kHz to 30 MHz have emission level of more than 10 dB below the limit.

Level = Reading + Correction Factor

Correction Factor = LISN factor + Cable Loss

Level is rounded off to one decimal place.

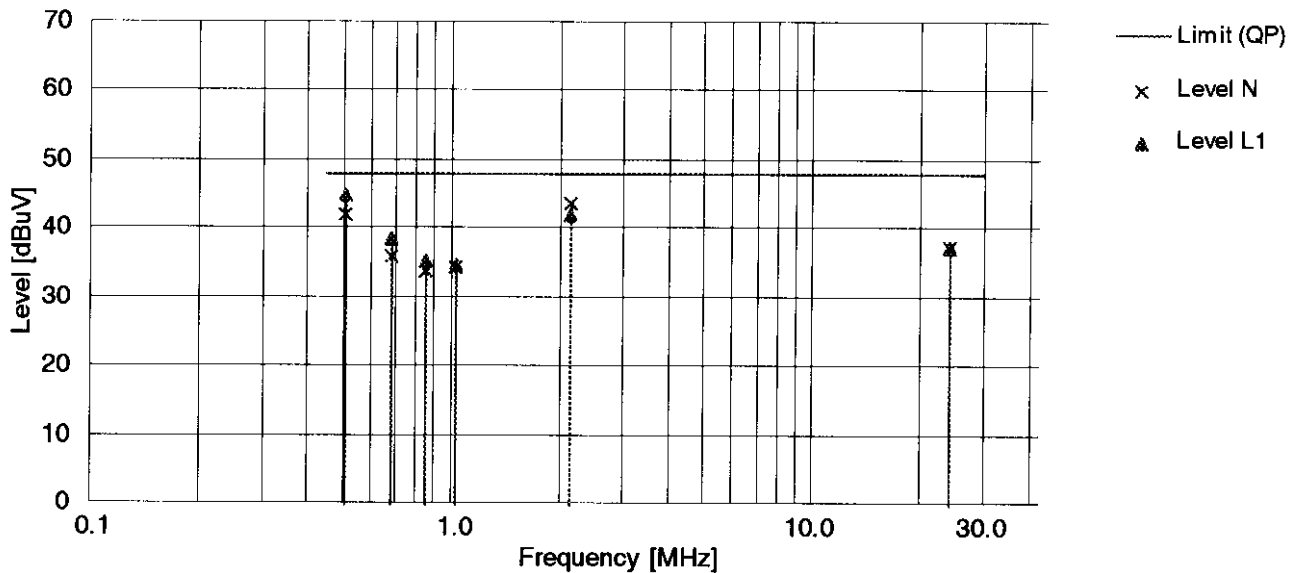
# EPSON

SEIKO EPSON CORPORATION

**Mode 2 : Serial interface**

Kind of Equipment	: Printer	Temperature	: 20 °C
Model Name	: P922A	Humidity	: 50 %
Serial No.	: 22GN000041	Engineer	: A. Hotta
Comment	: Serial I/F		
Detector	: QP	Date	: 98/10/29
Points	: 6	EMI Receiver(s)	: R/S ESH 2

Limit : [ FCC ] Class B



Frequency [MHz]	Reading N		Reading L1		QP-AVE [dB]	QP/AVE -13 [dB]	Correction Factor [dB]	Level N [dBuV]	Level L1 [dBuV]	Limit [dBuV]	Margin [dB]
	QP [dBuV]	AVE [dBuV]	QP [dBuV]	AVE [dBuV]							
0.5121	41.5	-	44.5	-	-	-	0.2	41.7	44.7	48.0	3.3
0.6854	35.5	-	38.0	-	-	-	0.2	35.7	38.2	48.0	9.8
0.8513	33.5	-	35.0	-	-	-	0.2	33.7	35.2	48.0	12.8
1.0262	34.0	-	34.5	-	-	-	0.2	34.2	34.7	48.0	13.3
2.1347	43.5	-	41.5	-	-	-	0.2	43.7	41.7	48.0	4.3
24.1080	36.0	-	36.0	-	-	-	1.3	37.3	37.3	48.0	10.7

Note : All other frequencies in the range from 450 kHz to 30 MHz have emission level of more than 10 dB below the limit.

Level = Reading + Correction Factor

Correction Factor = LISN factor + Cable Loss

Level is rounded off to one decimal place.

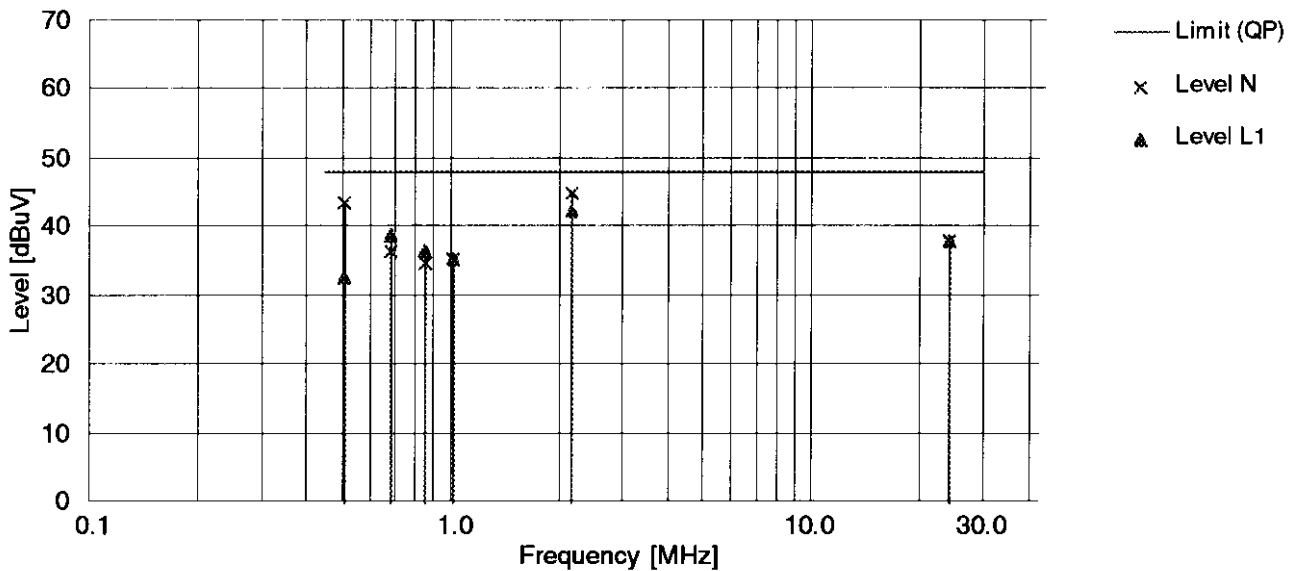


SEIKO EPSON CORPORATION

**Mode 3 : Option serial interface**

Kind of Equipment	: Printer	Temperature	: 20 °C
Model Name	: P922A	Humidity	: 50 %
Serial No.	: 22GN000041	Engineer	: A. Hotta
Comment	: Option serial I/F		
Detector	: QP, Ave	Date	: 98/10/29
Points	: 6	EMI Receiver(s)	: R/S ESH 2

Limit : [ FCC ] Class B



Frequency [MHz]	Reading N		Reading L1		QP-AVE [dB]	QP/AVE -13 [dB]	Correction Factor [dB]	Level N [dBuV]	Level L1 [dBuV]	Limit [dBuV]	Margin [dB]
	QP [dBuV]	AVE [dBuV]	QP [dBuV]	AVE [dBuV]							
0.5123	43.0	-	45.3	38.0	7.3	-13.0	0.2	43.2	* 32.5	48.0	4.8
0.6825	36.0	-	38.5	-	-	-	0.2	36.2	38.7	48.0	9.3
0.8533	34.5	-	36.0	-	-	-	0.2	34.7	36.2	48.0	11.8
1.0203	35.0	-	35.0	-	-	-	0.2	35.2	35.2	48.0	12.8
2.1771	44.5	-	42.0	-	-	-	0.2	44.7	42.2	48.0	3.3
24.1098	36.5	-	36.5	-	-	-	1.3	37.8	37.8	48.0	10.2

Note :All other frequencies in the range from 450 kHz to 30 MHz have emission level of more than 10 dB below the limit.

Level = Reading + Correction Factor

Correction Factor = LISN factor + Cable Loss

Level is rounded off to one decimal place.

\*Because the amplitude measured in the quasi-peak mode is at least 6 dB higher than the amplitude measured in the average mode, the level measured in the quasi-peak mode is reduced 13 dB.

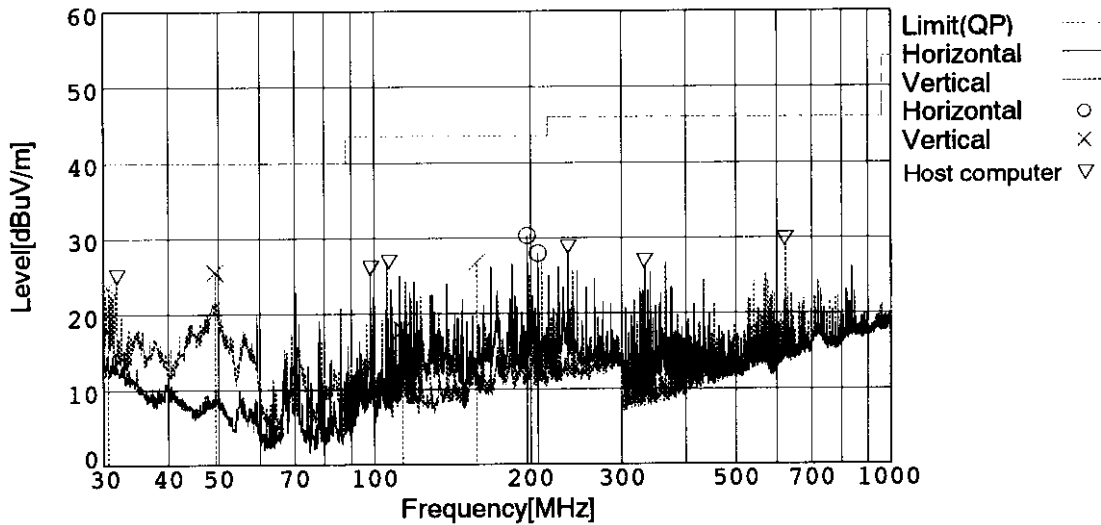


SEIKO EPSON CORPORATION

**4-3 Radiated Emission Test**

**Mode 1 : Parallel interface**

Kind of Equipment : Printer	Temperature : 23 °C
Model Name : P922A	Humidity : 45 %
Serial No. : 22GN000041	Engineer : A.Hotta
Comment : Parallel I/F	
Detector : QP	Date : 1998/10/28 15:23
Points : 6	EMI Receiver(s) : ESCS30
Limit: [FCC] Class B<3m>	



Frequency [MHz]	Meter Reading [dBuV]	Ant. Type	Antenna Factor [dB]	Total Loss [dB]	Level [dBuV/m]	Angle [degree]	Height [cm]	Pola.	Limit [dBuV/m]	Margin [dB]
30.599	25.0	BC	19.1	-20.5	23.6	258	100	Vert.	40.0	16.4
49.200	33.3	BC	12.0	-19.8	25.5	259	100	Vert.	40.0	14.5
113.306	24.3	BC	12.2	-18.7	17.8	243	100	Vert.	43.5	25.7
157.645	30.2	BC	14.9	-18.3	26.8	204	100	Vert.	43.5	16.7
197.057	31.6	BC	16.5	-17.8	30.3	183	168	Hori.	43.5	13.2
206.910	28.8	BC	16.8	-17.7	27.9	162	156	Hori.	43.5	15.6

Note : All other frequencies in the range from 30 MHz to 1000 MHz have emission level of more than 10 dB below the limit.

Level = Meter Reading + Antenna Factor + Total Loss (Total Loss = Cable Loss + Antenna Pad Loss - Amplifier Gain)

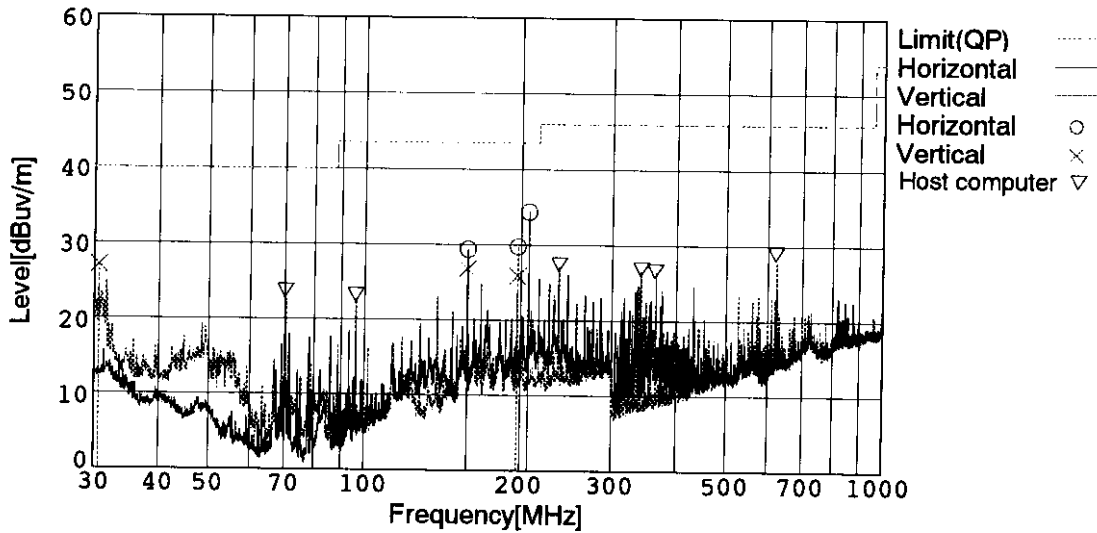
Level is rounded off to one decimal place.

# EPSON

SEIKO EPSON CORPORATION

**Mode 2 : Serial interface**

Kind of Equipment : Printer	Temperature : 23 °C
Model Name : P922A	Humidity : 45 %
Serial No. : 22GN000041	Engineer : A.Hotta
Comment : Serial I/F	
Detector : QP	Date : 1998/10/28 19:58
Points : 6	EMI Receiver(s) : ESCS30
Limit: [FCC] Class B<3m>	



Frequency [MHz]	Meter Reading [dBuV]	Ant. Type	Antenna Factor [dB]	Total Loss [dB]	Level [dBuV/m]	Angle [degree]	Height [cm]	Pola.	Limit [dBuV/m]	Margin [dB]
30.638	28.5	BC	19.1	-20.5	27.1	106	100	Vert.	40.0	12.9
157.655	30.2	BC	14.9	-18.3	26.8	270	100	Vert.	43.5	16.7
157.655	32.8	BC	14.9	-18.3	29.4	155	210	Hori.	43.5	14.1
197.071	31.0	BC	16.5	-17.8	29.7	162	162	Hori.	43.5	13.8
197.074	27.1	BC	16.5	-17.8	25.8	228	100	Vert.	43.5	17.7
206.926	35.2	BC	16.8	-17.7	34.3	169	147	Hori.	43.5	9.2

Note : All other frequencies in the range from 30 MHz to 1000 MHz have emission level of more than 10 dB below the limit.

Level = Meter Reading + Antenna Factor + Total Loss (Total Loss = Cable Loss + Antenna Pad Loss - Amplifier Gain)

Level is rounded off to one decimal place.

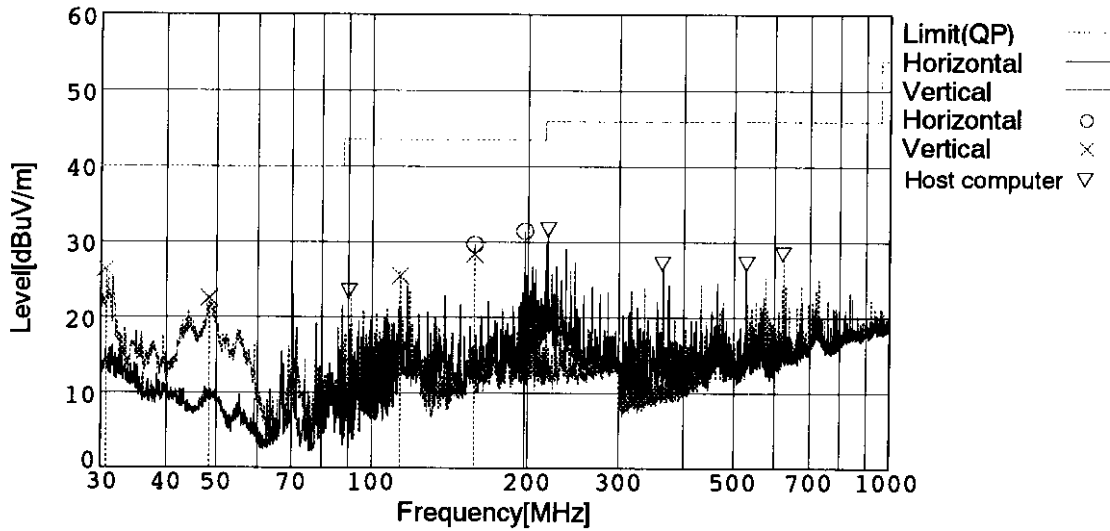
# EPSON

SEIKO EPSON CORPORATION

**Mode 3 : Option serial interface**

Kind of Equipment : Printer  
 Model Name : P922A  
 Serial No. : 22GN000041  
 Comment : Option Serial I/F  
 Detector : QP  
 Points : 6  
 Limit: [FCC] Class B<3m>

Temperature : 23 °C  
 Humidity : 45 %  
 Engineer : A.Hotta  
 Date : 1998/10/28 18:22  
 EMI Receiver(s) : ESCS30



Frequency [MHz]	Meter Reading [dBuV]	Ant. Type	Antenna Factor [dB]	Total Loss [dB]	Level [dBuV/m]	Angle [degree]	Height [cm]	Pola.	Limit [dBuV/m]	Margin [dB]
30.638	27.8	BC	19.1	-20.5	26.4	84	100	Vert.	40.0	13.6
48.532	30.2	BC	12.2	-19.9	22.5	239	100	Vert.	40.0	17.5
113.348	32.0	BC	12.2	-18.7	25.5	267	100	Vert.	43.5	18.0
157.653	33.1	BC	14.9	-18.3	29.7	168	196	Hori.	43.5	13.8
157.653	31.8	BC	14.9	-18.3	28.4	294	100	Vert.	43.5	15.1
197.061	32.7	BC	16.5	-17.8	31.4	174	157	Hori.	43.5	12.1

Note : All other frequencies in the range from 30 MHz to 1000 MHz have emission level of more than 10 dB below the limit.

Level = Meter Reading + Antenna Factor + Total Loss (Total Loss = Cable Loss + Antenna Pad Loss - Amplifier Gain)

Level is rounded off to one decimal place.

# EPSON

SEIKO EPSON CORPORATION

## 5. SUMMARY

### 5-1 Test Results

This test report clearly shows that the EUT complies with the FCC Part 15B Class B specification.

The minimum margins to the limits are as follows:

- Conducted measurement	3.3 dB	at	2.1771 MHz (Mode 1)
			0.5121 MHz (Mode 2)
			2.1771 MHz (Mode 3)
- Radiation measurement	9.2 dB	at	206.926 MHz (Mode 2)

This data represent the worst case emissions.

### 5-2 Sample Calculations

#### 5-2-1 Conducted Emission

Example 2.1771 MHz (Mode 1)

Emission Level	=	Meter Reading	44.5	dBuV
		+ Correction Factor	+	0.2
			<hr/>	
			=	44.7
				dBuV
Margin	=	Limit	48.0	dBuV
		- Emission Level	-	44.7
			<hr/>	
			=	3.3
				dB

Meter reading = Test receiver reading

The numerical value are rounded off to one decimal place.

#### 5-2-2 Radiated Emission

Example 206.926 MHz (Mode 2)

Emission Level	=	Meter Reading	35.2	dBuV
		+ Antenna Factor	+	16.8
		+ Total Loss	-	17.7
			<hr/>	
			=	34.3
				dBuV/m
Margin	=	Limit	43.5	dBuV/m
		- Emission Level	-	34.3
			<hr/>	
			=	9.2
				dB

Meter reading = Test Receiver reading

The numerical values are rounded off to one decimal place.

# EPSON

SEIKO EPSON CORPORATION

## 6. LIST OF UTILIZED TEST EQUIPMENT

### 6-1 Conducted Emission Measurement

Instrument	Manufacturer	Model Number	Serial Number	Last Calibration Date	Period
Spectrum Analyzer	Hewlett Packard	8567A	2718A00363	April 28, 1998	1 Year
Quasi-peak Adapter	Hewlett Packard	85650A	2521A00798	April 3, 1998	1 Year
Test Receiver	Rhode & Schwarz	ESH2	879013/027	April 1, 1998	1 Year
LISN	Rhode & Schwarz	ESH2-Z5	890484/004	September 4, 1998	1 Year

### 6-2 Radiated Emission Measurement

Instrument	Manufacturer	Model Number	Serial Number	Last Calibration Date	Period
Spectrum Analyzer	Hewlett Packard	8566B	2332A02675	August 24, 1998	1 Year
Quasi-peak Adapter	Hewlett Packard	85650A	2043A00284	August 24, 1998	1 Year
Pre-amplifier	Hewlett-Packard	87405A	3207A00888	March 18, 1998	1 Year
Test Receiver	Rhode & Schwarz	ESCS30	826547102	August 19, 1998	1 Year
Biconical Antenna	Schwarzbeck	BBA9106	-	August 31, 1998	1 Year
Log-periodic Antenna	EMCO	3146	8902-2354	September 1, 1998	1 Year

Note : The utilized instruments are calibrated by a body that can provide traceability to a national standard.

The abbreviation of antenna types which indicate on the radiated emission test table are follows:

BC : Biconical Antenna      LP : Log-periodic Antenna

### 6-3 Measurement Uncertainties

Measurement uncertainties are shown as below.

Conducted Emission Measurement	$\pm 2.33$ dB
Radiated Emission Measurement	5.15 dB / - 4.56 dB

Repeating and reproducing maximum emission set-up are not discussed herein.



# **EPSON**

SEIKO EPSON CORPORATION

## **7. VALIDITY OF TEST REPORT**

- 1: The test result of this report is effective for equipment under test itself and test configuration described on the report.
- 2: This test report shall not be reproduced without the written approval of the laboratory.
- 3: This test report must not be used by client to claim product endorsement by NVLAP or any agency of the U.S. Government.

## 8. DESCRIPTION OF TEST LABORATORY

### Bibliography

Since commencing operation in 1942 as a watch manufacturer, Seiko Epson Corporation has utilized its own original micromechatronics technologies, gained while developing quartz watches, to diversify into a variety of fields, as computers, printers and electronic devices, including semiconductors and liquid crystal displays. The phrase "highly functional and highly compact" best describes the policy of our product development activities.

Since the initial electrical printer was manufactured in 1971, Seiko Epson Corporation has been working for EMC field. It is a combination of precise machine technology and electric technology.

Now EMC group has 3 semi-anechoic chambers and 8 EMI/EMC test facilities and full responsibilities on EMC testing. It is independent from any other business organizations and admired by the president as neutral and it's independency.

### Filing, Certification and Accreditation List

#### EMC testing

- FCC (USA)
- NVLAP (Lab. Code: 200157-0) (USA)
- NMi (Netherlands)
- VCCI (Japan)
- NEMKO (Norway)

## Test Report Contents

	Page
<b>1. DETAILED DESCRIPTION OF TEST ITEM</b> . . . . .	4
1-1 Equipment Under Test	
1-2 Auxiliary equipment	
1-3 Relevant Signal and Power lines	
1-4 Positioning of Equipment	
<b>2. OPERATING CONDITIONS</b> . . . . .	9
2-1 Operating modes	
2-2 Operating cycles	
<b>3. TEST PROCEDURE(S)</b> . . . . .	10
<b>4. EVALUATION OF TEST RESULTS</b> . . . . .	11
4-1 Conducted Emission Test	
4-2 Photographs of conducted emission test	
4-3 Radiated Emission Test	
4-4 Photographs of radiated emission test	
<b>5. SUMMARY</b> . . . . .	23
5-1 Test Results	
5-2 Sample Calculations	
5-2-1 Conducted Emission Test	
5-2-2 Radiated Emission Test	
<b>6. LIST OF UTILIZED TEST EQUIPMENT</b> . . . . .	24
6-1 Conducted Emission Measurement	
6-2 Radiated Emission Measurement	
6-3 Measurement Uncertainties	
<b>7. VALIDITY OF TEST REPORT</b> . . . . .	25
<b>8. DESCRIPTION OF TEST LABORATORY</b> . . . . .	26

## 1. DETAILED DESCRIPTION OF TEST ITEM

### 1-1 Equipment Under Test (EUT)

Kind of equipment	: Printer
Shape	: Table-top type
Manufacturer	: SEIKO EPSON Corporation
Trade Name	: EPSON
Model Number	: P922A
FCC ID	: BKMFBP922A
Serial Number	: 22GN000041
Voltage input	: AC 120 V / 60 Hz
Rated current	: 1.0 A
Port(s) / Connector(s)	: Parallel (Centronics) Serial (RS-232C) Serial (RS-232C, Optional)
Oscillator(s) / Crystal(s)	: 19.66 MHz
Maximum used frequency	: 19.66 MHz
Remarks	: With Cut sheet feeder (C80684), Serial I/F card (C82307)

# EPSON

EPSON IMAGING TECHNOLOGY CENTER  
2833 JUNCTION AVE., STE. 200  
SAN JOSE, CALIFORNIA 95134  
PHONE: (408) 474-0500  
FAX: (408) 474-0511

January 12, 1999

FEDERAL COMMUNICATIONS COMMISSION  
C/O Mellon Bank  
Three Mellon Bank Center  
525 William Penn Way  
27<sup>th</sup> Floor, Rm. 153-2713  
Pittsburgh, Pennsylvania 15219

ATTN: Wholesale Lockbox Shift Supervisor

Re: FCC Application for Printer Model P922A  
FCC ID BKMFBP922A

Dear Shift Supervisor:

Enclosed herewith please find the following materials for FCC Application for BKMFBP922A  
Printer Model P922A

1. Request for Confidentiality
2. FCC Form 731
3. FCC Form 159
4. Check No. 130151 in the mount of \$940.00
5. Supporting Documents
6. Manuals

Should you have any questions regarding this matter, please contact me as soon as possible. Thank you  
for your immediate attention.

Best Regards,

  
Tak Shiozaki

Director  
EPSON Imaging Technology Center

Encl.

cc: Mr. Y. Takatsuna

TS/pba