

FCC ID : BKMFBP950A

**Original (for FCC)**

**EPSON**

SEIKO EPSON CORPORATION

***RFI MEASUREMENT TEST REPORT***

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

Test Report

\*\*\*\*\* CLASS B DIGITAL DEVICES AND PERIPHERALS \*\*\*\*\*

APPLICANT : SEIKO EPSON CORPORATION

EQUIPMENT : PRINTER

TRADE NAME : EPSON

MODEL NUMBER : P950A

FCC ID NUMBER : BKMFBP950A

TEST REPORT No. : E-103-98102



NVLAP LAB CODE 200157-0

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**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 : 15 June, 1998  
 Test completed : 15 June, 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 : Toshiyuki Omori T. Omori  
                                   EMC group, CS/Quality Assurance Office

Report checked by : Atsushi Shinozaki A. Shinozaki  
                                   Chief Engineer, EMC group, CS/Quality Assurance Office

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

Report issue date : 29 June, 1998

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

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## 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	: P950A
FCC ID	: BKMFBP950A
Serial Number	: 000001
Voltage input	: AC 120 V / 60 Hz
Rated current	: 0.4 A
Port(s) / Connector(s)	: Parallel (Centronics, standard)
Oscillator(s) / Crystal(s)	: 25 MHz, 14 MHz, 32.768 kHz (MAIN Board)
Maximum used frequency	: 25 MHz
Remarks	: -

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

AE	Name	Model (Serial number)	Manufacturer	FCC ID	Voltage input Power consumption	
1	Personal computer	D4594B (SG74350438)	Hewlett-Packard	N/A (DoC)	AC 120 V/ 60 Hz 3.0 A	
2	CRT monitor	D2830A (KR70913448)	Hewlett-Packard	A3LCGC560	AC 120 V/ 60 Hz 1.2 A	
3	Keyboard	RT6656TWJP (52370445)	Hewlett-Packard	AQ6-MTN4C15	DC 5.0 V 0.3 A	a)
4	Mouse	M-S34 (LZA72026370)	Hewlett-Packard	DZL211029	DC 5.0 V 15 mA	a)
5	Printer	P850A (1YLY185764)	SEIKO EPSON Corporation	BKMP850A	AC 120 V/ 60 Hz 1.0 A	b)

- a) Supply from personal computer (AE1)  
b) With color upgrade kit (C832081)

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**1-3 Relevant Signal and Power lines**

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

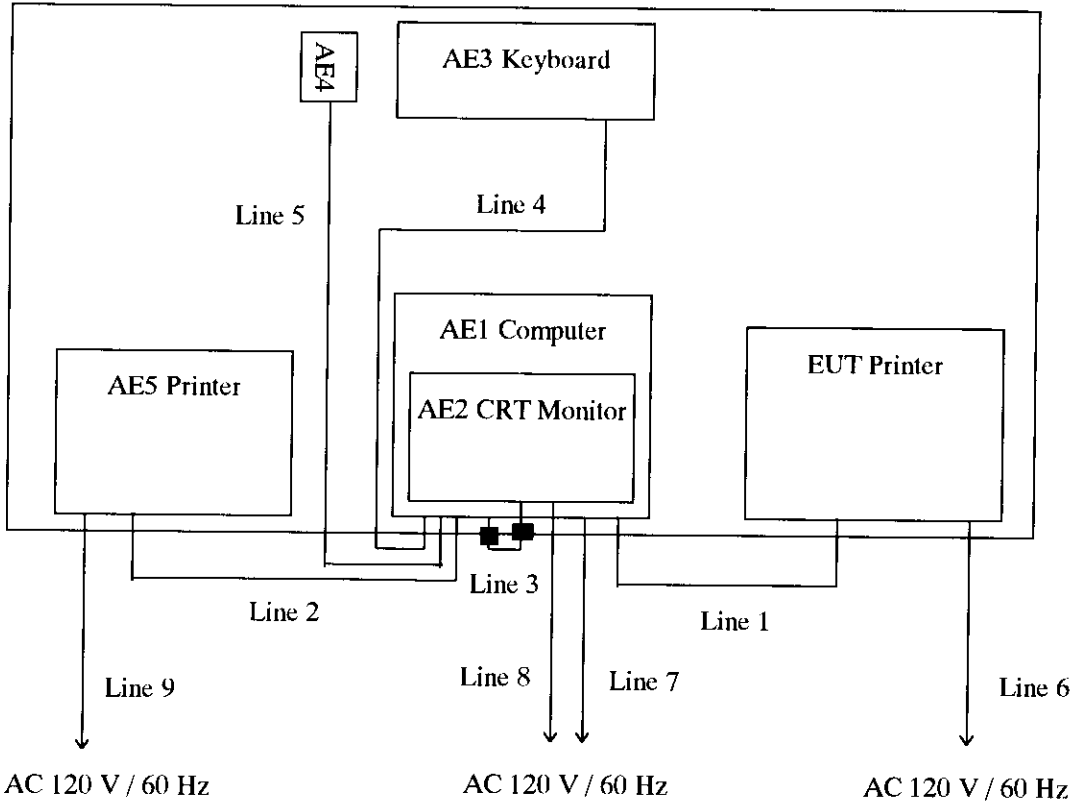
Line	Name	From	To	Length	Shield	Remarks
1	Parallel I/F cable	EUT Parallel in	AE1 Parallel out	2.0 m	Yes	Metal connector
2	Serial I/F cable	AE5 Serial in	AE1 Serial out	2.0 m	Yes	Metal connector
3	Video I/F cable	AE2 Video in	AE1 Video out	1.5 m	Yes	Metal connector
4	Keyboard I/F cable	AE3 Keyboard	AE1 Keyboard out	2.0 m	Yes	Metal connector
5	Mouse I/F cable	AE4 Mouse	AE1 Mouse out	1.8 m	Yes	Metal connector
6	Printer AC cable	EUT AC 120 V in	Main AC 120 V	2.0 m	No	
7	Computer AC cable	AE1 AC 120 V in	Main AC 120 V	2.2 m	No	
8	CRT AC cable	AE2 AC 120 V in	Main AC 120 V	2.2 m	No	
9	Printer AC cable	AE5 AC 120 V in	Main AC 120 V	2.0 m	No	

Note : Line 3 (video I/F cable) has two ferrite cores permanently attached.

### 1-4 Positioning of Equipment

The positioning of EUT during testing is as follows.

■ : Ferrite Core



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



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## 2. OPERATING CONDITIONS

The EUT is operated under the following conditions during the tests.

### 2-1 Operating modes

Mode : Parallel I/F

The EUT continuously printing character 'H' via the parallel interface with below operating cycles.

### 2-2 Operating cycles

Performed following operation continuously.

- 1: Print data are transferred from computer(AE1)
- 2: Print 'H' characters by EUT
- 3: Monitor(AE2) displays 'H' characters on the full screen
- 4: Print 'H' characters by printer (AE5)

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

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**3. TEST PROCEDURE(S)**

This test is 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



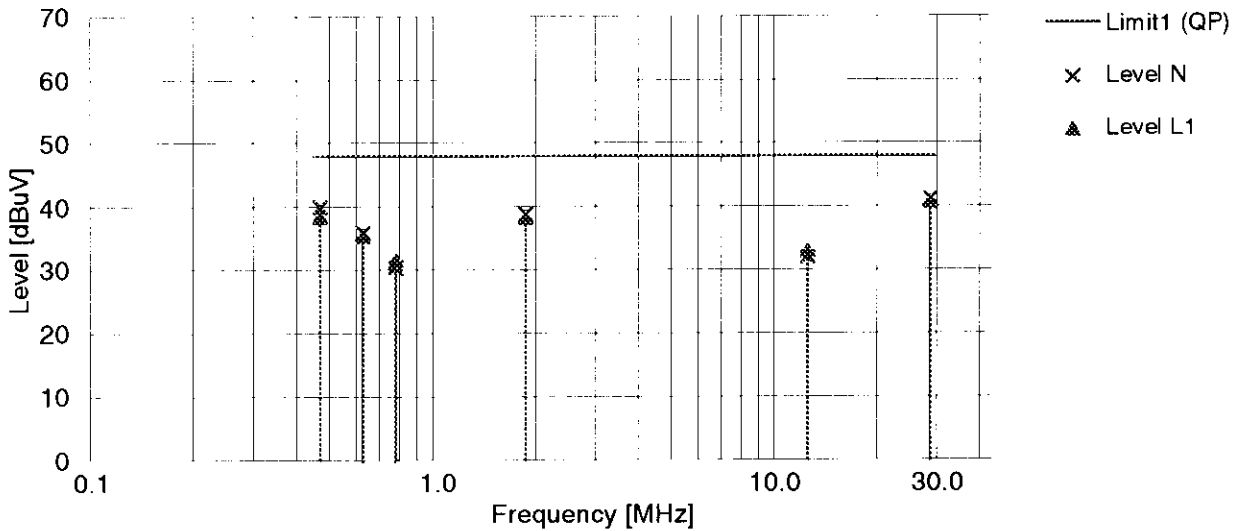
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### 4. EVALUATION OF TEST RESULTS

#### 4-1 Conducted Emission Test

Kind of Equipment	: Printer	Temperature	: 22 C
Model Name	: P950A	Humidity	: 60 %
Serial No.	: 000001	Engineer	: T. Omori
Comment	: -		
Detector	: QP	Date	: 98/6/15
Points	: 6	EMI Receiver(s)	: R/S ESH 2

Limit1 : [ 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]							
0.4694	39.5	-	38.0	-	-	-	0.4	39.9	38.4	48.0	8.1
0.6279	35.5	-	35.0	-	-	-	0.3	35.8	35.3	48.0	12.2
0.7836	30.0	-	31.0	-	-	-	0.3	30.3	31.3	48.0	16.7
1.8774	38.5	-	38.0	-	-	-	0.3	38.8	38.3	48.0	9.2
12.5323	30.0	-	31.0	-	-	-	1.9	31.9	32.9	48.0	15.1
28.6378	38.5	-	38.0	-	-	-	2.7	41.2	40.7	48.0	6.8

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

Correction factor = LISN factor + Cable loss

Level is rounded off to one decimal place.



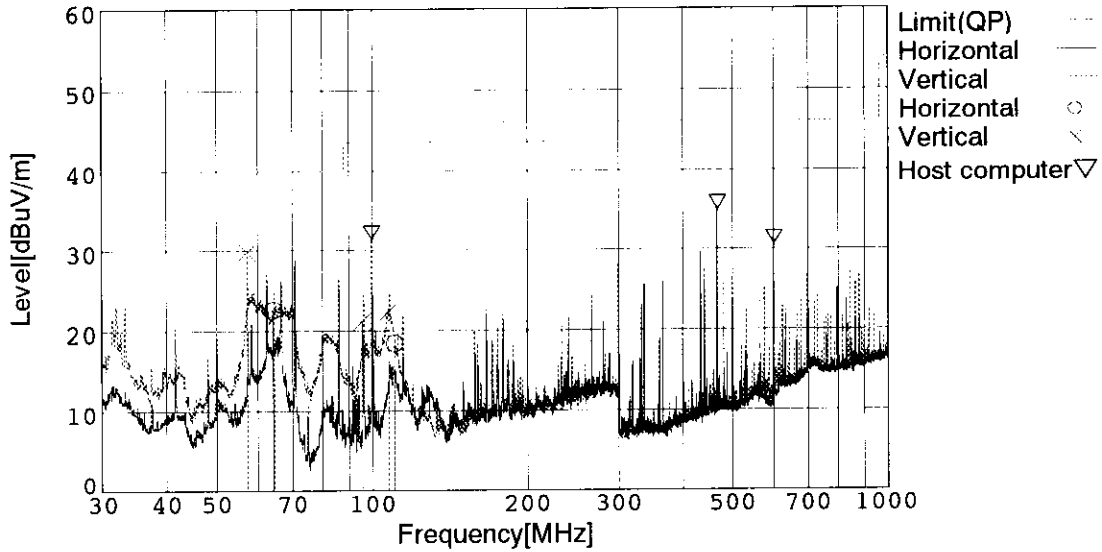
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4-3 Radiated Emission Test

Kind of Equipment : Printer  
 Model Name : P950A  
 Serial No. : 000001  
 Comment : -  
 Detector : QP  
 Points : 6  
 Limit: [FCC] Class B<3m>

Temperature : 22 C  
 Humidity : 50 %  
 Engineer : T. Omori

Date : 1998/6/15 10:55  
 EMI Receiver(s) : ESS



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]
57.222	40.1	BC	9.4	-19.7	29.8	210	100	Vert.	40.0	10.2
64.330	34.2	BC	8.0	-19.6	22.6	91	306	Hori.	40.0	17.4
64.610	36.8	BC	7.9	-19.6	25.1	234	100	Vert.	40.0	14.9
95.662	31.0	BC	9.1	-19.0	21.1	47	100	Vert.	43.5	22.4
107.420	30.0	BC	11.1	-18.8	22.3	208	100	Vert.	43.5	21.2
110.180	25.7	BC	11.5	-18.7	18.5	277	282	Hori.	43.5	25.0

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

Total loss = Cable loss + Antenna pad loss - Amplified gain

Level is rounded off to one decimal place.

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## 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      6.8 dB      at      28.6378 MHz
- Radiation measurement      10.2 dB      at      57.222 MHz

This data represent the worst case emissions.

### 5-2 Sample Calculations

#### 5-2-1 Conducted Emission

Example 28.6378 MHz

$$\begin{array}{rcl}
 \text{Emission Level} & = & \text{Meter Reading} & 38.5 & \text{dBuV} \\
 & & + \text{ Correction Factor} & + & 2.7 & \text{dB} \\
 & & & & \hline
 & & = & 41.2 & \text{dBuV}
 \end{array}$$

$$\begin{array}{rcl}
 \text{Margin} & = & \text{Limit} & 48.0 & \text{dBuV} \\
 & & - \text{ Emission Level} & - & 41.2 & \text{dBuV} \\
 & & & & \hline
 & & = & 6.8 & \text{dB}
 \end{array}$$

Meter reading = Test Receiver reading

The numerical value are rounded off to one decimal place.

#### 5-2-2 Radiated Emission

Example 57.222 MHz

$$\begin{array}{rcl}
 \text{Emission Level} & = & \text{Meter Reading} & 40.1 & \text{dBuV} \\
 & & + \text{ Antenna Factor} & + & 9.4 & \text{dB} \\
 & & + \text{ Total Loss} & - & 19.7 & \text{dB} \\
 & & & & \hline
 & & = & 29.8 & \text{dBuV/m}
 \end{array}$$

$$\begin{array}{rcl}
 \text{Margin} & = & \text{Limit} & 40.0 & \text{dBuV/m} \\
 & & - \text{ Emission Level} & - & 29.8 & \text{dBuV/m} \\
 & & & & \hline
 & & = & 10.2 & \text{dB}
 \end{array}$$

Meter reading = Test Receiver reading

The numerical values are rounded off to one decimal place.

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## 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	879013/021	June 3, 1998	1 Year
LISN	Rhode & Schwarz	ESH2-Z5	890484/004	August 20,1997	1 Year

### 6-2 Radiated Emission Measurement

Instrument	Manufacturer	Model Number	Serial Number	Last Calibration Date	Period
Spectrum Analyzer	Hewlett Packard	8566B	2332A02675	July 25, 1997	1 Year
Quasi-peak Adapter	Hewlett Packard	85650A	2043A00284	July 25, 1997	1 Year
Test Receiver	Rhode & Schwarz	ESS	844362/001	August 14, 1997	1 Year
Biconical Antenna	Schwarzbeck	BBA9106	-	February 11, 1998	1 Year
Log-periodic Antenna	EMCO	3146	8910-2511	November 24, 1997	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.

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## 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.

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## 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 its independency.

### Filing, Certification and Accreditation List

#### EMC testing

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