AKZO NOBEL

T E S T R E P O R T

REPORT NUMBER	**:**	**AKL-399069**
APPLICANT	**:**	**FUJITSU LIMITED**
MODEL NUMBER	**:**	**CA04339-C801**
FCC ID	**:**	**C9SDP050M33111Z1**
REGULATION	**:**	**FCC Part15B Class B** **Canada ICES-003 Class B**

Conducted Emission Test
Radiated Emission Test

NVLAP®
LAB CODE 100290- 3

NVLAP accreditation is valid only FCC Part15(Digital Devices), CISPR22, and AS/NZS 3548 test reports.

Akzo Kashima Limited
EMC Division
Nagano Site

3226, Yokokawa, Tatsuno-machi, Kamiina-gun
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SECTION 1. TEST CERTIFICATION

APPLICANT INFORMATION

Company	:	FUJITSU LIMITED
Address	:	Marunouchi Center Bldg. 6-1 Marunouchi 1-chome Chiyoda-ku Tokyo 100-0005 Japan
Telephone number	:	+81 3 3215 5101
Fax number	:	+81 3 3216 9352

DESCRIPTION OF TEST ITEM

Kind of equipment	:	Serial interface board
Condition of equipment	:	Production
Type	:	Table-Top(Built-in type)
Trademark	:	FUJITSU
FCC ID	:	C9SDP050M33111Z1
Model number	:	CA04339-C801
Serial number	:	None

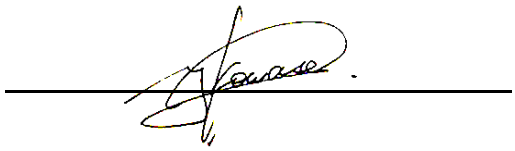
TEST PERFORMED

Location	:	Nagano No. 1 Test Site (FCC File No. : 31040/SIT)
Test started	:	April 13, 1999
Test completed	:	April 14, 1999
Purpose of test	:	FCC Docket 87-389 and Canadian Interference-Causing Equipment Regulations
Regulation	:	FCC Part15B Class B and Canada ICES-003 Class B Unintentional Radiators
Test setup	:	ANSI C63.4-1992

Report file number : AKL-399069

Report issue date : April 20, 1999

Test engineer : Naohei Murakami

Report approved by : Yoshio Kowase [Site Manager] 

This equipment complies with above standard or regulation under the test condition or test configuration shown on this test report.

SECTION 2. CONCLUSION

This test report clearly shows that the EUT is in compliance with the FCC Part 15B Class B specification and the Canada ICES-003 Class B specification.

Traceability to national standards of test result is achieved by means of calibration traceability to national standards.

The minimum margins to the limits are as follows:

Conduction measurement			
M33111A02 mode	7.4 dB	at	0.4749 MHz
Radiation measurement			
M33111A02 mode	6.1 dB	at	47.60 MHz

Note : See Section 9 for details.

SECTION 3. EQUIPMENT UNDER TEST

The equipment under test (EUT) consisted of the following equipment.
Indication in the following left side column corresponds to Section 6.

Symbol	Item	Model No.	Serial No.	FCC ID / DoC	Manufacturer	Remarks
A)	Serial interface board	CA04339-C801	None	C9SDP050M 33111Z1	FUJITSU LIMITED	EUT

Power ratings of EUT : DC 5V (Power for Printer AC 120V, 60 Hz)

DoC : Device for Declaration of Conformity

3.1 Port(s)/Connector(s) :

Port name	Connector type	Connector pin	Remarks
Serial interface	D-sub	25 pin	RS-232C

3.2 Oscillator(s)/Crystal(s) :

Oscillator	Operating frequency	Board name	Remarks
None			

SECTION 4. SUPPORT EQUIPMENT USED

The EUT was supported by the following equipment during the test.
Indication in the following left side column corresponds to Section 6.

Symbol Item	Model No.	Serial No.	FCC ID / DoC	Manufacturer	Remarks
B) Printer	M33111A02	00065	C9SDP050M33111 A1	FUJITSU LIMITED	Install EUT
C) Computer	8550-031	90-5012094	ANO9SA8550-S	IBM	
D) Keyboard	M	1391401	N.A.	IBM	
E) CRT Display	8512-001	72-0071350	ANO7NF8512	IBM	
F) Printer	M3359A	002192	C9S69NDP012A1	FUJITSU LIMITED	

DoC : Device was tested and authorized under a Declaration of Conformity to the applicable FCC rules.

SECTION 5. CABLE (S) USED

The following cable(s) was used for the test.
Indication number in the following left side column corresponds to Section 6.

Number	Name	Length	Shield	Connector
1)	Centronics cable	3.00 m	Yes	Metal
2)	RS-232C cable	3.00 m	Yes	Metal
3)	Keyboard cable (Curl cord)	1.60 m	Yes	Metal
4)	CRT Display cable	1.60 m	Yes	Metal
5)	Power cord for Printer	3.00 m	None	
6)	Power cord for Computer	1.80 m	None	
7)	Power cord for CRT Display	1.80 m	None	
8)	Power cord for Printer	3.00 m	None	

Note :

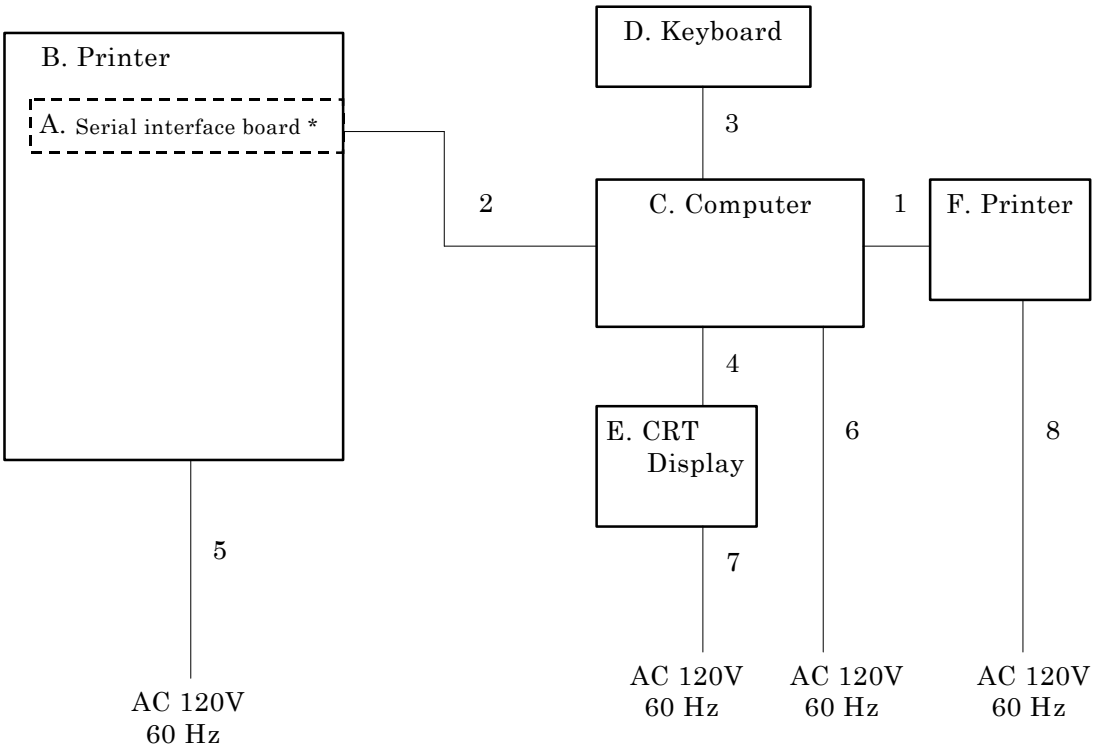
a. No ferrite core is attached to the outer cables.

SECTION 6. CONSTRUCTION OF EQUIPMENT

The construction of EUT during the test was as follows.

System configuration

* : EUT



Symbols or numbers assigned to equipment or cables on this diagram are corresponded to the symbols or numbers assigned to equipment or cables on tables in Sections 3 to 5.

SECTION 7. OPERATING CONDITIONS

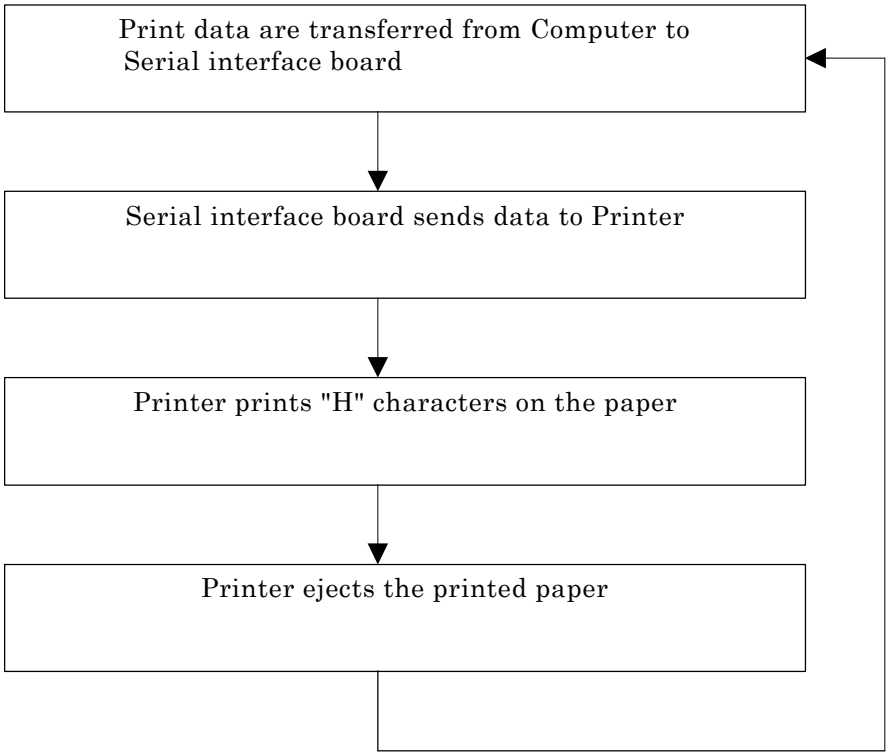
The EUT was operated under the following conditions during the test.

7.1 Operating condition

The tests was carried out under M33111A02 mode.
EUT was examined in the operating conditions that had maximum emissions.

7.2 Operating flow

Performed following operations continuously

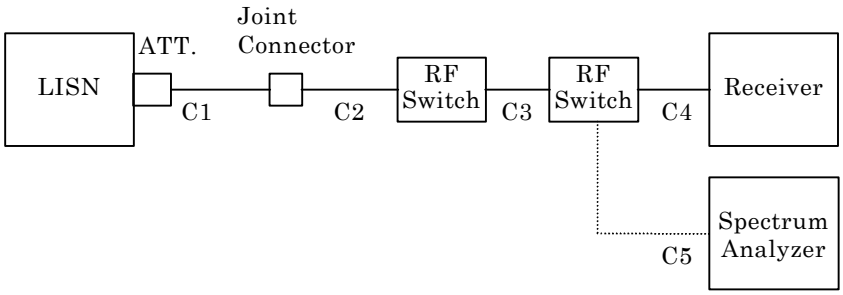


SECTION 8. TEST PROCEDURE(S)

Tests were carried out under the following conditions.
Tests were carried out with no deviations from standards and test methods.

Subject	Test procedure	Measurement software	Scan frequency
Conducted Emission	Akzo Kashima Document number : 03-10-004	emiT Ver. 1,3,5,0	0.45 - 30 MHz
Radiated Emission	Akzo Kashima Document number : 03-10-003	emiT Ver. 1,3,5,0	30 - 1000 MHz

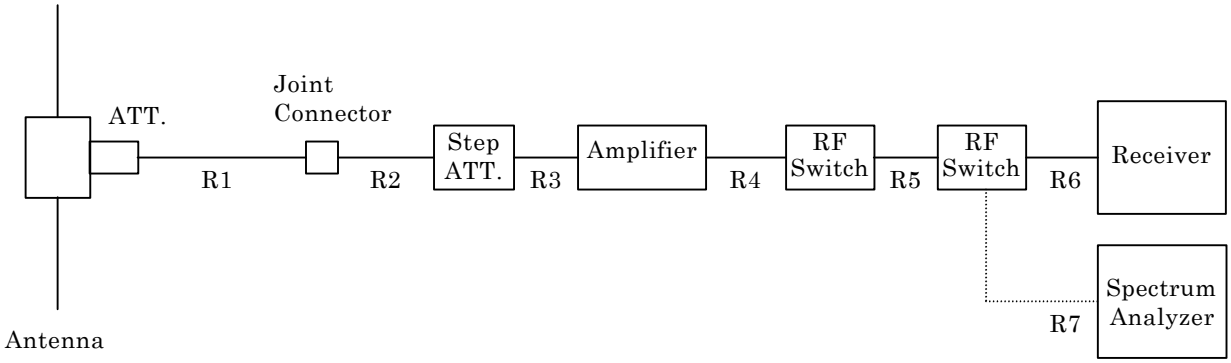
Schema for the conducted measurement



Abbreviations : LISN = Line Impedance Stabilization Network
Line Impedance Stabilization Network(LISN) = Artificial Mains Network(A.M.N.)

Abbreviations : ATT. = Attenuator

Schema for the radiated measurement



Summary ;

8.1 Conducted Emission Test

8.1.1 Equipment Setup

System configuration and Equipment setup are shown on Section 6 and Section 10.

8.1.1.1 Table-Top Equipment

EUT is placed on the wooden table raised 0.8meter above the metal ground plane.

8.1.1.2 Interconnecting Cables

Excess part of the interconnecting cables longer than 1 meter are bundled in the center. Cables that hang closer than 40 cm to the ground plane is folded back and forth forming bundle 30 to 40 cm long, hanging approx, in the middle between ground plane and table.

8.1.1.3 AC Power Cord

AC power cord for EUT is connected to one LISN which is placed on top of ground plane. The LISN is placed in 80 cm from the nearest part of EUT chassis.
The excess power cable is bundled in the center, or shortened to appropriate length.
AC cables except from the EUT are connected second LISN.

8.1.2 Measuring Instruments

Measuring instruments list and calibration schedule are shown on Section 11, and brief description are as follows;

8.1.2.1 Spectrum Analyzer

The Spectrum analyzer is used for preliminary measurement.

8.1.2.2 EMI Test Receiver

The Quasi-peak detector(Resolution bandwidth : 10 kHz) and average detector (Resolution bandwidth : 10 kHz) built in test receiver is used for final measurement.
The test receiver is complied with the specification of the CISPR publication 16.

8.1.2.3 LISN

The 50uH/ 50ohm LISN is used. The chassis of the LISN is bonded to the ground plane by the copper blade.
The lead to be tested is selectable by switch, and the terminals which are not connected to the EUT are terminated in 50ohm resistor termination.

8.1.3 Test Procedure

8.1.3.1 Preliminary Measurement

EUT is tested on all operating conditions.
The spectrum analyzer is controlled by the computer program to sweep regulation frequency, then spectrum chart are plotted out to detect the worst conditions in operating mode and/or configuration for the final test.
All leads other than safety ground are tested.

8.1.3.2 Final Measurement

The EUT is operated in the worst condition where maximum emission is detected by the preliminary test. The equipment and cables are arranged or manipulated within the range of the test standard in the above condition.
The each spectrum to be tested are measured in quasi-peak using the test receiver. When the value in the quasi-peak mode is higher than the limit in the standard, the measurement in the average mode is done to compare to the value in the quasi-peak mode. If the value in the quasi-peak mode exceeds the value in the average mode by more than 6 dB, the value reducing 13 dB from the value in the quasi mode is used to compare to the limit.

8.2 Radiated Emission Test

8.2.1 Equipment Setup

System configuration and Equipment setup are shown on Section 6 and Section 10.

8.2.1.1 Table-Top Equipment

EUT is placed on the wooden table raised 0.8meter above the metal ground plane(turntable).

8.2.1.2 Interconnecting Cables

Excess part of the interconnecting cables longer than 1 meter are bundled in the center. Cables that hang closer than 40 cm to the ground plane is folded back and forth forming bundle 30 to 40 cm long, hanging approx, in the middle between ground plane and table.

8.2.2 Measuring Instruments

Measuring instruments list and calibration schedule are shown on Section 11, and brief description are as follows;

8.2.2.1 Antennas

The broadband Bi-cog antenna is used for measurement on the frequency range 30 1000 MHz.
If uncertain result was obtained, the broadband antenna is replaced by the half wave length dipole, then measurement is carried out over again.

8.2.2.2 Pre-amplifier

The broadband pre-amplifier is used for radiated emission measurement.
The signal to noise ratio is improved by using pre-amplifier.

8.2.2.3 Spectrum Analyzer

The spectrum analyzer is used for preliminary measurement of frequency range 30 1000 MHz.

8.2.2.4 EMI Test Receiver

The Quasi-peak detector(Resolution bandwidth : 120 kHz) built in test receiver is used for final measurement of the frequency 30 1000 MHz.
The test receiver is complied with the specification of the CISPR publication 16.

8.2.2.5 Turntable

The turntable is capable for EUT weight and rotatable 0 to 360 degree horizontally by remote control in the test room.

8.2.2.6 Antenna Mast

The antenna mast is attachable to all antennas described on clause 8.2.2.1 and antenna height is adjustable 1 to 4 meters continuously by remote control at the test room, and antenna polarization is also changed by the remote control.

8.2.3 Test Procedure

8.2.3.1 Preliminary Measurement

EUT is tested on all operating conditions.
The spectrum analyzer is set max-hold mode and swept during turntable was rotated 0 to 360 degree. Then spectrum chart are plotted out to detect the worst conditions in configuration, operating mode, or ambient noise notation.

8.2.3.2 Final Measurement

The EUT operated in the condition where maximum emission is detected in the preliminary test.
The turntable azimuth(EUT direction) and antenna height are adjusted the position so that maximum field strength is obtained for each frequency spectrum to be measured. The equipment and cables are arranged or manipulated within the range of the test standard in the above condition.
When the uncertain result was obtained, the measurement is retried by using the half wave dipole antenna instead of the broadband antenna.

SECTION 9. EVALUATION OF TEST RESULTS

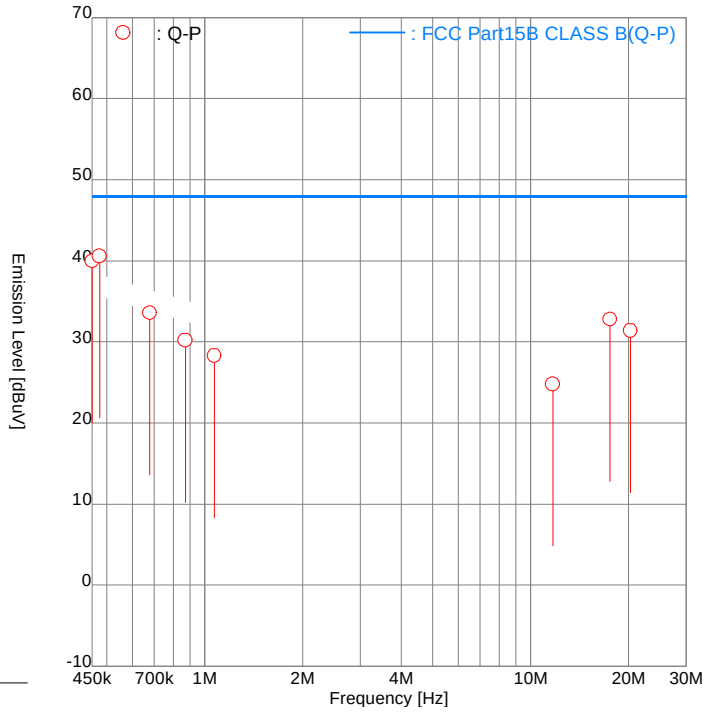
9.1 Conducted Emission Test

Akzo Kashima Limited

Nagano No.1 Test Site

INTERFERENCE CONDUCTION TEST

APPLICANT : FUJITSU LIMITED
EUT NAME : Serial I/F Board
MODEL NO. : CA04339-C801
SERIAL NO. : None
TEST MODE : M33111A02
POWER SOURCE : DC 5V (AC120V/60Hz)
DATE TESTED : Apr 14 1999
FILE NO. : AKL-399069
REGULATION : FCC Part15B CLASS B
TEST METHOD : ANSI C63.4-1992



ENGINEER : Naohei Murakami

No	FREQUENCY [MHz]	READING [dBuV] Line1	READING [dBuV] Line2	FACTOR [dB] Line1	FACTOR [dB] Line2	EMISSION [dBuV] Line1	EMISSION [dBuV] Line2	LIMIT [dBuV]	MARGIN [dB] Line1	MARGIN [dB] Line2
1	0.4500	33.1	33.3	6.7	6.7	39.8	40.0	48.0	8.2	8.0
2	0.4749	31.7	34.0	6.6	6.6	38.3	40.6	48.0	9.7	7.4
3	0.6769	25.7	27.1	6.5	6.5	32.2	33.6	48.0	15.8	14.4
4	0.8717	23.3	23.7	6.5	6.5	29.8	30.2	48.0	18.2	17.8
5	1.0705	21.9	21.3	6.4	6.4	28.3	27.7	48.0	19.7	20.3
6	11.6832	17.6	18.1	6.7	6.7	24.3	24.8	48.0	23.7	23.2
7	17.5254	24.9	25.7	7.1	7.1	32.0	32.8	48.0	16.0	15.2
8	20.2587	24.0	24.1	7.3	7.3	31.3	31.4	48.0	16.7	16.6

Higher six points are underlined.
Other frequencies : Below the FCC Part15B CLASS B limit
Emisson Level = Read + Factor(LISN,Pad,Cable)

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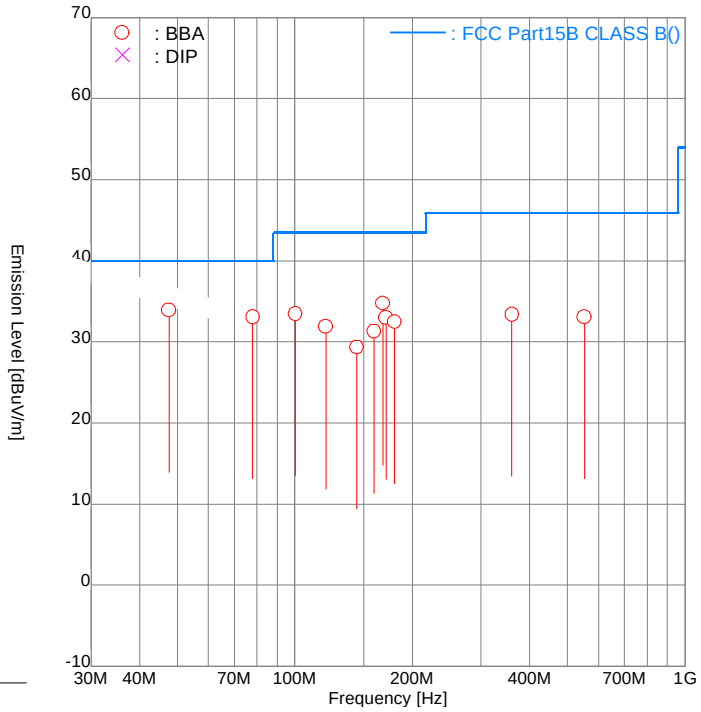
9.2 Radiated Emission Test

Akzo Kashima Limited

Nagano No.1 Test Site

INTERFERENCE RADIATION TEST

APPLICANT	: FUJITSU LIMITED
EUT NAME	: Serial I/F Board
MODEL NO.	: CA04339-C801
SERIAL NO.	: None
TEST MODE	: M33111A02
POWER SOURCE	: DC 5V (AC120V/60Hz)
DATE TESTED	: Apr 13 1999
FILE NO.	: AKL-399069
REGULATION	: FCC Part15B CLASS B
TEST METHOD	: ANSI C63.4-1992
DISTANCE	: 3.0 [m]
TEMPERATURE	: 22.0 [degC]
HUMIDITY	: 60.0 [%]



ENGINEER : Naohei Murakami

No	FREQUENCY [MHz]	ANT.	READING [dBuV] Hori	READING [dBuV] Vert	FACTOR [dB] Hori	FACTOR [dB] Vert	EMISSION [dBuV/m] Hori	EMISSION [dBuV/m] Vert	LIMIT [dBuV/m]	MARGIN [dB] Hori	MARGIN [dB] Vert
1	47.60	BBA	-	38.7	-4.8	-4.8	-	33.9	40.0	-	6.1
2	77.95	BBA	-	45.3	-12.2	-12.2	-	33.1	40.0	-	6.9
3	100.24	BBA	-	42.0	-8.5	-8.5	-	33.5	43.5	-	10.0
4	120.00	BBA	-	38.6	-6.7	-6.7	-	31.9	43.5	-	11.6
5	144.00	BBA	-	38.7	-9.3	-9.3	-	29.4	43.5	-	14.1
6	159.62	BBA	-	41.0	-9.7	-9.7	-	31.3	43.5	-	12.2
7	168.00	BBA	41.8	43.1	-8.3	-8.3	33.5	34.8	43.5	10.0	8.7
8	171.03	BBA	40.6	40.9	-7.9	-7.9	32.7	33.0	43.5	10.8	10.5
9	180.00	BBA	-	40.6	-8.1	-8.1	-	32.5	43.5	-	11.0
10	359.99	BBA	35.2	-	-1.8	-1.8	33.4	-	46.0	12.6	-
11	552.00	BBA	31.6	-	1.5	1.5	33.1	-	46.0	12.9	-

Higher six points are underlined.
Other frequencies : Below the FCC Part15B CLASS B limit
Emisson Level = Read + Factor(Antenna,Antenna Pad,Cable,Preamp)
ANT. : Used antenna(BBA = Broadband antenna, DIP = Dipole antenna)

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9.3 Sample Calculations

9.3.1 Conducted Emission

			Example @ 0.4749 MHz
Emission Level	=	Meter Reading	34.0 dBuV
	+	Factor	+ 6.6 dB
			= 40.6 dBuV
Margin	=	Limit	48.0 dBuV
	-	Emission Level	- 40.6 dBuV
			= 7.4 dB

Factor = LISN Factor + Cable Loss + Pad Loss

9.3.2 Radiated Emission

			Example @ 47.60 MHz
Emission Level	=	Meter Reading	38.7 dBuV
	+	Factor	- 4.8 dB
			= 33.9 dBuV/m
Margin	=	Limit	40.0 dBuV/m
	-	Emission Level	- 33.9 dBuV/m
			= 6.1 dB

Factor = Antenna Factor + Cable Loss - Amplifier Gain + Pad Loss
Distance Conversion Factor

SECTION 10. PHOTOGRAPHS OF MAXIMUM EMISSION SET-UP

10.1 Conducted Emission Test

Test setup in accordance with ANSI C63.4-1992

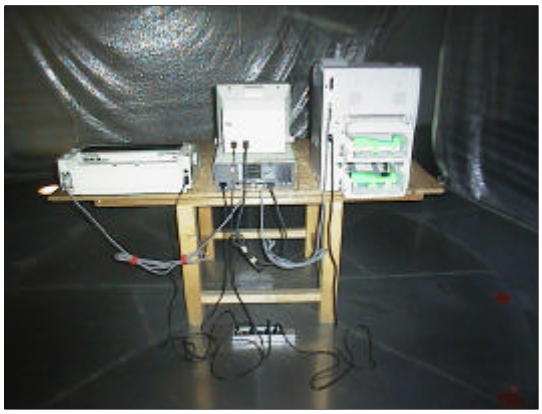
Front view

Rear view

10.2 Radiated Emission Test

Test setup in accordance with ANSI C63.4-1992

Front view



Rear view

Note : Maintaining 10cm spacing between all the equipment cabinets.

SECTION 11. INSTRUMENTS USED FOR FINAL TEST

Instrument	Model No.	Serial No.	Manufacturer	Last cal. date	Period
LISN	ESH2-Z5	881493/016	ROHDE & SCHWARZ	Jul. 8, 98	1 Year
	ESH3-Z5	844982/001	ROHDE & SCHWARZ	Oct.13, 98	1 Year
6dB Attenuator	CFA-01	N1	TAMAGAWA	May.28, 98	1 Year
Coaxial cable	5D-2W (4.0 m)	C1	AKZO	Nov. 5, 98	1 Year
Coaxial cable	5D-2W (3.0 m)	C2	AKZO	Nov. 5, 98	1 Year
Coaxial cable	5D-2W (0.2 m)	C3	AKZO	Nov. 5, 98	1 Year
Coaxial cable	5D-2W (2.0 m)	C4	AKZO	Nov. 5, 98	1 Year
Broad Band antenna	LPB-2513/A	1089	A.R.A.	Jun. 4, 98	1 Year
6dB Attenuator	MP721B	M58224	ANRITSU	Jan. 5, 99	1 Year
Step Attenuator	8494B	2812A15953	HEWLETT PACKARD	Nov. 5, 98	1 Year
Amplifier	8447D	2648A04721	HEWLETT PACKARD	Jan. 5, 99	1 Year
Coaxial cable	5D-2W (15.0 m)	R1	AKZO	Nov. 5, 98	1 Year
Coaxial cable	5D-2W (3.0 m)	R2	AKZO	Nov. 5, 98	1 Year
Coaxial cable	5D-2W (0.3 m)	R3	AKZO	Nov. 5, 98	1 Year
Coaxial cable	5D-2W (1.0 m)	R4	AKZO	Nov. 5, 98	1 Year
Coaxial cable	5D-2W (0.2 m)	R5	AKZO	Nov. 5, 98	1 Year
Coaxial cable	5D-2W (2.0 m)	R6	AKZO	Nov. 5, 98	1 Year
Test receiver	ESS	842886/009	ROHDE & SCHWARZ	May.16, 98	1 Year
RF Switch	ACX-150-1	C01301501	AKZO	Nov. 5, 98	1 Year
Site Attenuation				Mar.31, 99	1 Year

Note : Test instruments are calibrated according to Quality Manual and Calibration Rules of EMC division.

SECTION 12. UNCERTAINTY OF MEASUREMENT

Uncertainty of measurement

The uncertainty of the measurements performed for this report lies:

Radiated emission at 3m

30 MHz	1000 MHz	+/- 3.6 dB

Conducted emission

9 kHz	30 MHz	+/- 1.8 dB

These figures indicate the uncertainty of the measurements when the same staff performs the test with the same testing equipment and facility.
The uncertainty of the measurements when a different staff with different equipment and facility are under study.

Please note that these uncertainty are not reflected to the compliance judgement of the test results in this report.

SECTION 13. VALIDITY OF TEST REPORT

13.1 The test result of this report is effective for equipment under test itself and under the test configuration described on the report.

13.2 This test report does not assure that whether the test result taken in other testing laboratory is compatible or reproducible to the test result on this report or not.

13.3 Copying of this report without permission is prohibited.

SECTION 14. DESCRIPTION OF TEST LABORATORY

14.1 Outline of Akzo Kashima Limited, EMC Division

Akzo Kashima Ltd. was established in 1975 for manufacturing specialty chemicals. The shares are owned by Akzo Nobel KK (70%), the country organization in Japan for Akzo Novel nv., and TOSOH Corporation (30%), one of the leading petrochemical manufacturers in Japan. Akzo Nobel, headquartered in the Netherlands, is one of the world s leading companies in selected areas of chemicals, coatings, healthcare products and fibers with work force of approximately 70,000 people in over 50 countries.

In 1984, in order to respond to the growing testing demand, in particular, for FCC filing, Akzo Kashima started EMI testing business, installing the first open air test site in Kashima, Ibaraki prefecture. Further the business has been expanded by installing additional testing facilities not only in Kashima but also in other areas such as Shizuoka, Nagano, Kanagawa and Tochigi. As results, Akzo Kashima has now 16 open air test sites and 4 anechoic chambers for EMI/EMC testing. As the largest EMC testing laboratory in number of testing facilities and staffs, EMC Division has been organized separately in the company and independently operated in conformity with the requirements of ISO Guide 25 (EN 45000) for its competency as a testing laboratory.

Akzo Kashima EMC Division is the first foreign private laboratory accredited by NVLAP, National Voluntary Laboratory Accreditation Program-NIST, USA. The division has been certified, authorized and/or filed as a competent testing laboratory by various testing organizations/authorities as described below.

14.2 Filing, certification, authorization and accreditation list

EMI/EMC testing		Telecommunications terminal testing	
FCC	(USA)	FCC	(USA)
NVLAP	(USA)	NVLAP	(USA)
NEMKO	(Norway)	NATA	(Australia)
VCCI	(Japan)	IC	(Canada)
NMi	(The Netherlands)		
TÜV PRODUCT SERVICE	(Germany)		

Note : NVLAP accreditation does not constitute any product endorsement by NVLAP or any agent of the U.S. Government.