

EMC TEST REPORT

for

SAMSUNG ELECTRONICS CO., LTD.

416, Maetan-3Dong, Paldal-Gu, Suwon City, Kyungki-Do, Korea

Equipment Under Test: CD-R/RW DRIVE
Model Name : SW-207
<Brand Name : RICOH, Model Name : MP7063A · RW7063A>
FCC ID : A3LSW207
Category: FCC Part 15 Sub.part B Class B Digital Device
Token Report No.: T3K005083
Date of Issue: June 8, 2000


Hiro Shida
Manager, Tsukuba Testing Lab.
Token EMC Engineering Co., Ltd.

-- ATTENTION --

The test results in this report relate only to the following EUTs, and this report shall not be reproduced except in full, without the written approval of the laboratory.
This test report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

Contents

	<i>Page</i>
1 DESCRIPTION OF DEVICE	1
2 TEST FACILITY	2
3 SUMMARY OF RESULTS	
3.1 Electromagnetic Emission	2
3.2 Modification to The EUT.....	2
4 TESTED SYSTEM DETAILS	
4.1 Peripherals and Others	3
4.2 Type of Used Cables	4
4-1 System Configuration Diagram.....	5
5 TECHNICAL COUNTERMEASURE	5
6 TEST RESULTS	
6.1 RFI Voltage Measurement	
6.1.1 Measurement Instrumentation Used	6
6.1.2 Measurement Procedure.....	6
6.1.3 Measurement Uncertainty.....	6
6.1.4 Test Data.....	7 ~ 8
6.2 RFI Field Strength Measurement	
6.2.1 Measurement Instrumentation Used	9
6.2.2 Measurement Procedure.....	10
6.2.3 Measurement Uncertainty.....	10
6.2.4 Test Data.....	11 ~ 13
6.3 Minimum Margin.....	14
6.4 Sample Calculation.....	14
7 MEASUREMENT PHOTOS	
Photo 7.1 Setup with the Maximized RFI Voltage Emission Level.....	15
Photo 7.2 Setup with the Maximized RFI Field Strength Emission Level	16 ~ 17

1 DESCRIPTION OF DEVICE

A) Kind of Equipment :	CD-R/RW DRIVE
B) FCC ID :	A3LSW207
C) Model Name :	SW-207 <Brand Name : RICOH> < Model Name : MP7063A · RW7063A>
D) Serial No. :	None
E) Type of Sample Tested :	Pre-production
F) High Frequency Used :	33.8688MHz (DSP) 18MHz (MICOM) 240 ~ 300MHz (Pick-up)
G) Rating Power Supply :	DC5 ~ 12V, 2.5/1.0A
H) Tested Power Supply :	1phase AC120V, 60Hz (PC)
I) Date of Manufacture :	May 2000
J) Manufacturer :	SAMSUNG ELECTRONICS CO., LTD. 416, Maetan-3Dong, Paldal-Gu, Suwon City, Kyungki-Do, Korea
K) Description of Operating :	Test Program (Read and Write)
L) Date of Sample Received :	May 9, 2000
M) Test Engineer :	Masayuki Kuramochi

2 TEST FACILITY

The open field test site and conducted measurement facility are used for these testing, where are located following address. This site was fully described in a report dated Feb.12,1998, that was submitted to the FCC. And we had accepted in a letter dated Mar.30,1998 (31040/SIT). This laboratory is accredited by NVLAP for NVLAP Lab. Code : 200221-0.

Tokin EMC Engineering Co., Ltd.

Tsukuba Testing Laboratory, Open Field Test Site No.3 and Shielded Room No.1

Address ; 28-1, Kitahara-aza, Hanashimashinden-ohaza, Tsukuba-city, Ibaragi 305-0875, Japan

3 SUMMARY OF RESULTS

3.1 Electromagnetic Emission

RFI Voltage Measurement **PASS**

RFI Field Strength Measurement **PASS**

Although the measured emissions indicate that the EUT complies with the required limits, some measurements are close to these limits. When the uncertainty of measurement is considered, there is some possibility that the EUT may not be compliant.

Test results are traceable to JQA, TELEC and NIST.

3.2 Modifications to The EUT : None

4 TESTED SYSTEM DETAILS**4.1 Peripherals and Others :**

Description	Model Name	Serial No.	Manufacturer	FCC ID
CRT Display Monitor	500-069EV	15025E025557	Gateway	BEJCS592
PC	GP6-366C	00637503	Gateway	DoC
Mouse	1.1A PS/2	0446932-10000	Microsoft	C3KKMP5
Modem	MODEM1414	9018905	ACEEX	IFAXDM1414
AC Adapter for Modem	SCP41-91000A	None	ACEEX	DoC
Keyboard	G9900	981214	Microsoft	GYUR61SK
Speaker	GL-600	None	None	DoC
Earphone	None	None	None	DoC
Microphone	None	None	TELEX	DoC
Printer	BJC-50V	None	Canon	DoC
AC Adapter for Printer	AD-360U	E9803364872	Canon	DoC
Game Controller Pad	Game Pad Pro	None	GRAVIS	HYN4202A
USB Camera	LPC-U20	3850R-M103L	LG	DoC
USB Play Pad	PK-GP101	8500054S	NEC	DoC

4.2 Type of Used Cables :

Description	Length	Type of shield	Model name	Manufacturer
1 AC power cable for CRT Display Monitor	2.5m	Non-shielded	None	None
2 CRT Display Monitor cable	1.8m	Shielded	None	Gateway
3 AC power cable for PC	2.2m	Non-shielded	None	None
4 Earphone cable	1.3m	Non-shielded	None	None
5 RS232C cable	1.5m	Shielded	None	SPACE SHATTLE
6 Printer cable	1.5m	Shielded	None	Canon
7 AC Adapter cable for Printer (DC side)	1.0m	Non-shielded	None	Canon
8 AC Adapter cable for Printer(AC side)	1.5m	Non-shielded	None	Canon
9 Line cable	1.0m × 2	Non-shielded	None	None
10 DC power cable for Modem	1.9m	Non-shielded	None	ACEEX
11 AC cable for Speaker	1.25m	Non-shielded	None	None
12 Speaker cable	1.0m	Non-shielded	None	None
13 Speaker cable	1.2m	Non-shielded	None	None
14 Microphone cable	2.3m	Non-shielded	None	TELEX
15 USB Play Pad cable	2.5m	Shielded	None	NEC
16 USB Camera cable	1.5m	Shielded	None	LG
17 Mouse cable	1.9m	Shielded	None	Microsoft
18 Keyboard cable	1.7m	Shielded	None	Microsoft
19 Game Controller cable	1.8m	Shielded	None	GRAVIS

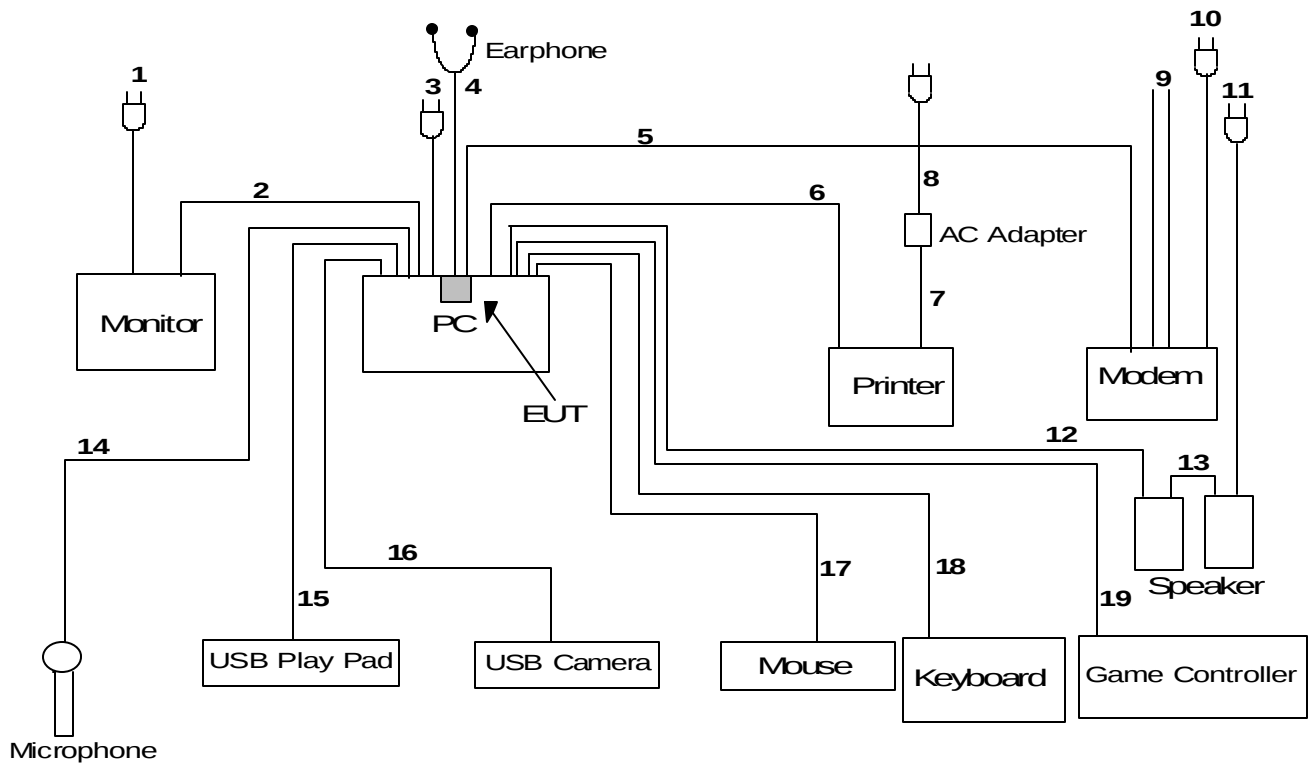


Figure 4-1 System Configuration Diagram

5 TECHNICAL COUNTERMEASURE:

None

6 TEST RESULTS

6.1 RFI Voltage Measurement

6.1.1 Measurement Instrumentation Used

(model/serial no./manufacturer/Tokin control no./last calibration/next calibration)

Field strength meter (FCKL1528/134/Schwarzbeck/RE041/01 Dec.'99/Nov.'00)

L.I.S.N. (KNW-407/8-515-20/Kyoritsu/LI010/09 Sep.'99/Sep.'00)

Spectrum analyzer (R3131/81781094/Advantest/SP040/23 Mar.'00/Mar.'01)

Coaxial cable (---/---/---/DK124/01 Mar.'00/Feb.'01)

Shielded Room..... (Tsukuba No.1-S/---/Tokin/SA016/---/---)

6.1.2 Measurement Procedure

The power line conducted interference measurements were performed according to ANSI C63.4-1992 in a shielded enclosure No.1 with peripherals placed on a table, 0.8m high over a metal floor. It was located more than required distance away from the shielded enclosure wall. Deviations from the standard was none. The EUT was plugged into the LISN and the frequency range of interest scanned. Reported are maximized emission levels.

6.1.3 Measurement Uncertainty

Measurement uncertainty of RFI Voltage Measurement test was estimated at $\pm 0.6\text{dB}(k=2)$.

6.1.4 Test Data

Table 6.1-1 RFI Voltage Measurement Results

Operating mode: Test Program (Read and Write)
Test procedure: ANSI C63.4-1992

Date of measurement: May 10, 2000

Temperature: 24 degree C

Humidity: 62 %

	Frequency (MHz)	Level (dBm V)	Total Factor(dB)	Result (dBm V)	Result (m V)	Limit (m V)	Margin (dB)
L1-E	0.796	25.0	0.0	25.0	17.78	250	23.0
	2.388	31.0	0.0	31.0	35.48	250	17.0
	4.975	33.0	0.1	33.1	45.19	250	14.9
	5.272	32.0	0.1	32.1	40.27	250	15.9
	17.807	26.0	0.4	26.4	20.89	250	21.6
	25.465	32.0	0.6	32.6	42.66	250	15.4
N-E	0.796	25.0	0.2	25.2	18.20	250	22.8
	2.388	26.0	0.2	26.2	20.42	250	21.8
	4.975	25.5	0.4	25.9	19.72	250	22.1
	5.272	25.0	0.4	25.4	18.62	250	22.6
	17.807	24.0	0.7	24.7	17.18	250	23.3
	25.465	35.0	1.0	36.0	63.10	250	12.0

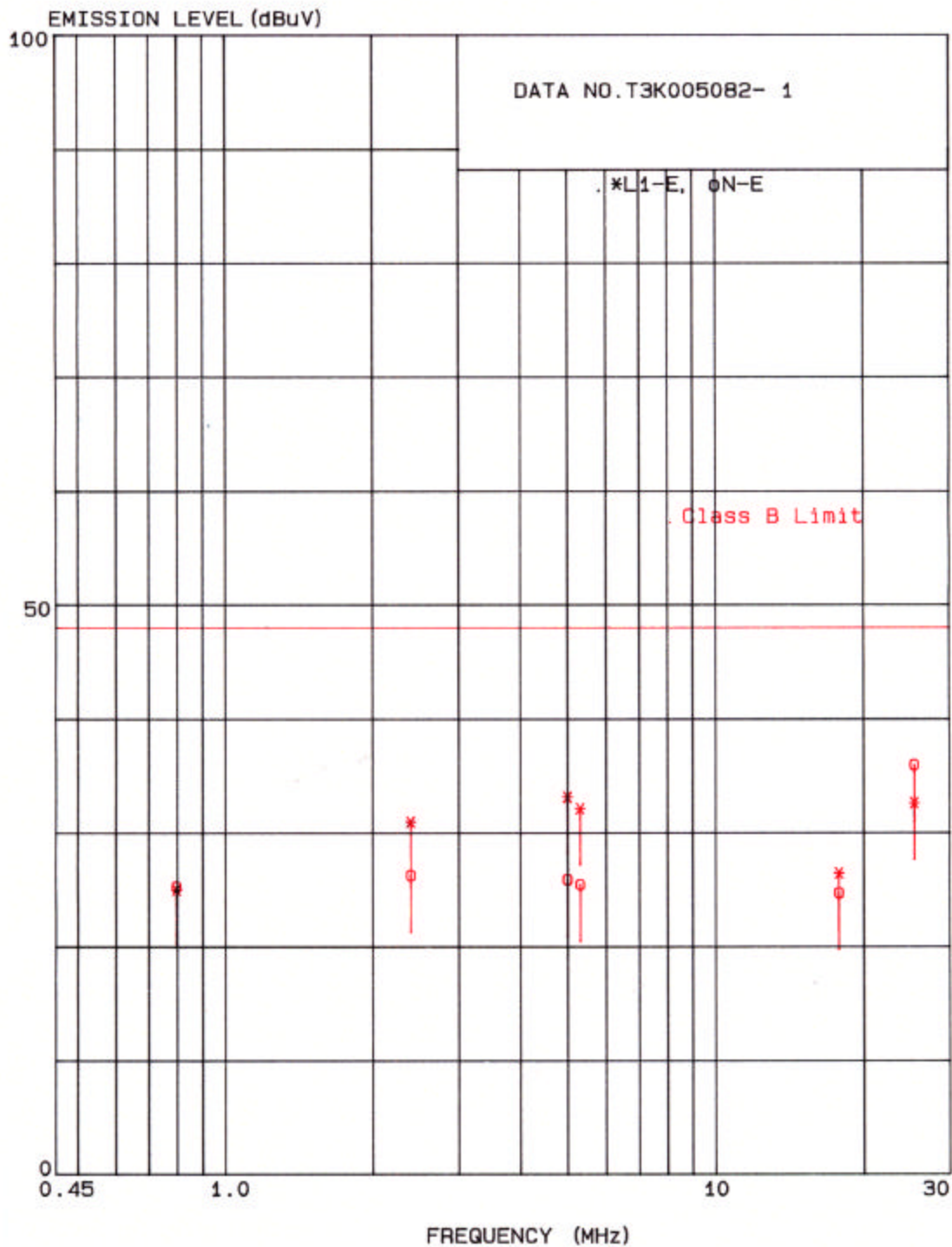


Figure 6.1-1 RFI Voltage Measurement Results

6.2 RFI Field Strength Measurement

6.2.1 Measurement Instrumentation Used

(model/serial no./manufacturer/Tokin control no./last calibration/next calibration)

< 30MHz ~ 1000MHz >

Field strength meter (ESV/892371-001/Rohde&Schwarz/RE021/11 Jan.'00/Jan.'01)
 Biconical Antenna (BBA9106/---/Schwarzbeck/TB002/06 Jul.'99/Jul.'00)
 Logperiodic Antenna (UHALP9108-A/0111/Schwarzbeck/TL019/06 Jul.'99/Jul.'00)
 Pre-amplifier (8447D/2432A03554/Hewlett Packard/AM003/08 Sep.'99/Sep.'00)
 Spectrum analyzer (MS2601A/MT20851/Anritsu/SP005/09 Nov.'99/Nov.'00)
 Coaxial cable (---/CL310/---/DK087/01 Jul.'99/Jun.'00)
 Open field test site (Tsukuba No.3/---/Tokin/SA003/02 Jul.'99/Jul.'00)

< 1000MHz ~ 2000MHz >

Pre-amplifier (8449B/3008A00681/Hewlett Packard/rental/23 Nov.'99/Nov.'00)
 Double ridge
 guide horn antenna..... (3115/90053420/EMCO/AN003/20 Mar.'00/Mar.'01)
 Spectrum analyzer (8563E/3450A02894/Hewlett Packard/SP036/01 Oct.'99/Sep.'00)
 Coaxial cable (SUCOFLEX 104/79580-4/SUCOFLEX/DK118/17 Nov.'99/Nov.'00)
 Coaxial cable (SUCOFLEX 104/85672-4/SUCOFLEX/DK119/17 Nov.'99/Nov.'00)
 Coaxial cable (SUCOFLEX 104/85673-4/SUCOFLEX/DK120/17 Nov.'99/Nov.'00)
 Open field test site (Tsukuba No.3/---/Tokin/SA003/02 Jul.'99/Jul.'00)

6.2.2 Measurement Procedure

Final test was performed according to ANSI C63.4-1992 at the open field test site No.3. Deviations from the standard was none.

The EUT was placed in a 0.8m high table along with the peripherals. The turn table was separated from the antenna distance 3meters. Cables were placed in a position to produce maximum emissions as determined by experimentation, and operation mode was selected for maximum.

The frequencies and amplitudes of maximum emission were measured at varying azimuths, antenna heights and antenna polarities. Reported are maximized emission levels.

6.2.3 Measurement Uncertainty

Measurement uncertainty of RFI Field Strength Measurement test was estimated at $\pm 2.8\text{dB}(k=2)$.

6.2.4 Test Data

Table 6.2-1a RFI Field Strength Measurement Results
(30MHz ~ 1000MHz)

Operating mode: Test Program (Read and Write) Date of measurement: May 10, 2000
Test procedure: ANSI C63.4-1992 Temperature: 21 degree C
Humidity: 68 %

Frequency (MHz)	Level Ver. Hor. (dBm V)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp. Gain (dB)	Result Ver. Hor. (dBm V/m)	Result Ver. Hor. (m V/m)	3 Meter Limit (m V/m)	Margin Ver. Hor. (dB)
35.76	42.0 -	15.8	1.4	27.6	31.6 -	38.02 -	100	8.4 -
42.82	- 42.0	11.9	1.5	27.5	- 27.9	- 24.83	100	- 12.1
44.69	51.0 -	11.5	1.7	27.6	36.6 -	67.61 -	100	3.4 -
66.36	44.0 43.0	6.0	2.1	27.6	24.5 23.5	16.79 14.96	100	15.5 16.5
73.77	- 47.0	6.2	2.2	27.6	- 27.8	- 24.55	100	- 12.2
99.65	40.0 -	9.7	2.7	27.6	24.8 -	17.38 -	150	18.7 -
271.10	- 40.0	19.5	4.8	27.6	- 36.7	- 68.39	200	- 9.3
271.18	46.0 -	19.5	4.8	27.6	42.7 -	136.46 -	200	3.3 -
316.78	- 44.0	16.5	5.2	27.7	- 38.0	- 79.43	200	- 8.0
332.50	- 46.0	16.4	5.3	27.6	- 40.1	- 101.16	200	- 5.9
332.93	42.0 -	16.4	5.4	27.6	36.2 -	64.57 -	200	9.8 -
381.03	38.0 41.5	18.7	5.7	27.6	34.8 38.3	54.95 82.22	200	11.2 7.7
405.59	- 37.0	19.0	6.0	27.7	- 34.3	- 51.88	200	- 11.7
406.32	30.0 -	19.0	6.0	27.7	27.3 -	23.17 -	200	18.7 -
465.16	- 43.0	16.4	6.5	27.3	- 38.6	- 85.11	200	- 7.4
527.91	37.0 -	20.7	7.2	27.3	37.6 -	75.86 -	200	8.4 -
542.20	- 38.0	21.0	7.3	27.3	- 39.0	- 89.13	200	- 7.0
586.85	- 38.0	20.7	7.5	27.2	- 39.0	- 89.13	200	- 7.0
787.61	30.0 -	20.9	9.5	26.8	33.6 -	47.86 -	200	12.4 -
787.62	- 33.0	20.9	9.5	26.8	- 36.6	- 67.61	200	- 9.4

Class B limit

Radiated Emission – 3 meter distance

Frequency (MHz)	dBμV/m	μV/m
30 - 88	40.0	100
88 - 216	43.5	150
216 - 960	46.0	200
> 960	54.0	500

Table 6.2-1b RFI Field Strength Measurement Results
(1000MHz ~ 2000MHz)

Operating mode: Test Program (Read and Write)
Test procedure: ANSI C63.4-1992

Date of measurement: May 10, 2000
Temperature: 19 degree C
Humidity: 70 %

Frequency	Level	Ant.	Cable	Amp.	Result	Result	3 Meter	Margin
(MHz)	Ver. Hor.	Factor	Loss	Gain	Ver. Hor.	Ver. Hor.	Limit	Ver. Hor.
	(dBm V)	(dB/m)	(dB)	(dB)	(dBm V/m)	(m V/m)	(m V/m)	(dB)

Test results were under the required limit with 20dB margin or more.

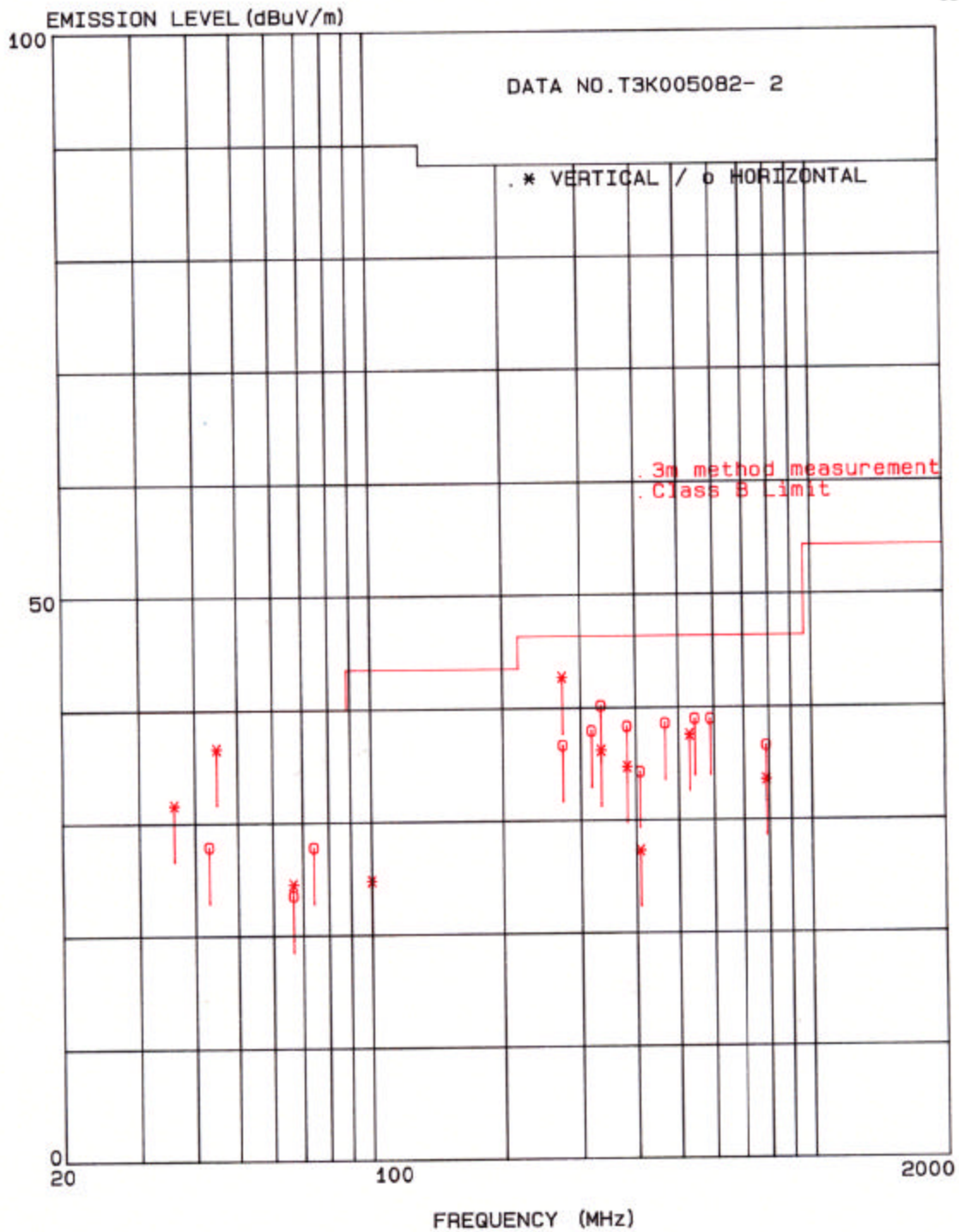


Figure 6.2-1 RFI Field Strength Measurement Results

6.3 Minimum Margin

Table 6.3-1 Minimum Margin

<u>Conducted emission</u>					
Test program					
(Read & Write)	operation mode	25.465	MHz,	12.0	dB
<u>Radiated emission</u>					
Test program					
(Read & Write)	operation mode	271.18	MHz,	3.3	dB

6.4 Sample Calculation

Table 6.4-1 Sample Calculation

The maximum radiating emission can be obtained at the frequency of **271.18** MHz,
Vertical polarization on **Test program(Read & Write)** operation mode.

Each value at frequency is as follows;

R :	Field strength meter reading	=	46.0	(dBμV)
A :	Antenna factor	=	19.0	(dB/m)
C :	Cable loss	=	4.8	(dB)
G :	Amplifier gain	=	27.6	(dB)

Then radiated emission E(dBμV/m) is ;

$$E = R + A + C - G$$

Therefore, the maximum radiated emission is ;

42.7 (dBμV/m)

7 MEASUREMENT PHOTOS

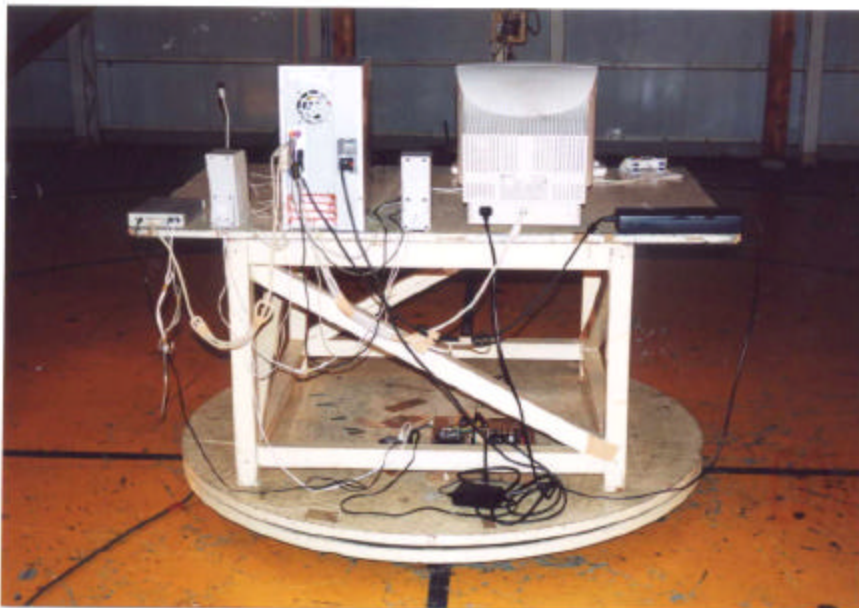
Photo 7.1 Setup with the Maximized RFI Voltage Emission Level



Photo 7.2a Setup with the Maximized RFI Field Strength Emission Level
(30MHz ~ 1000MHz)



FIRMATION

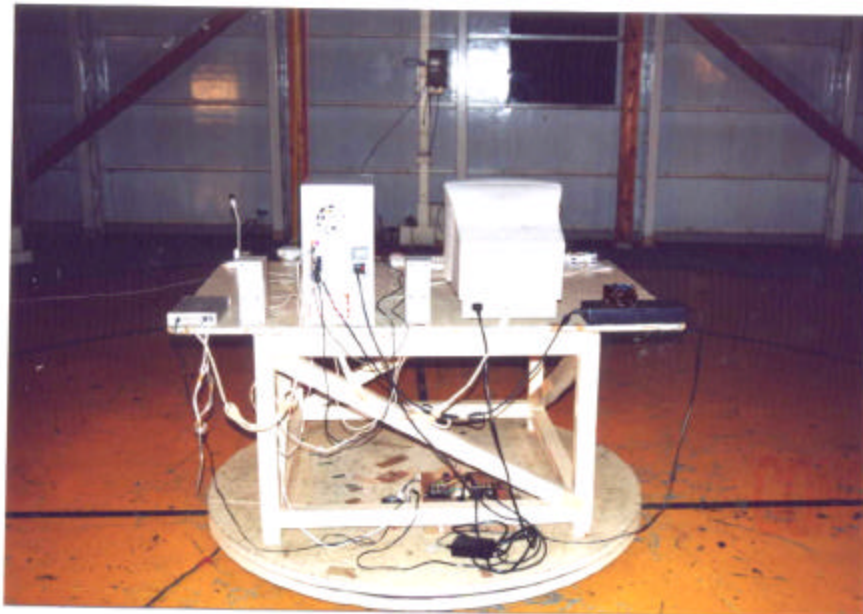


FIRMATION

Photo 7.2b Setup with the Maximized RFI Field Strength Emission Level
(1000MHz ~ 2000MHz)



FIRMATION



IRMATION