

EXHIBIT D

EMC TEST REPORT

for

Hitachi Maxell, Ltd.

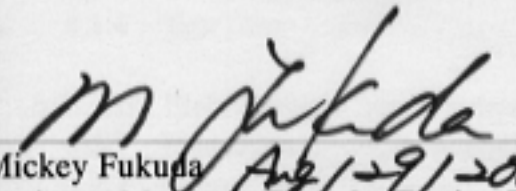
6139-1, Ohnogo, Mitsukaido-shi, Ibaraki 300-2595, Japan

Equipment Under Test: IC Card Reader/Writer
Model Name : M-660A

Category: FCC Part 15 Sub,part B Class B Digital Device

Tokin Report No.: TAK007461

Date of Issue: August 25, 2000


Mickey Fukuda
Assistant Manager, Tsukuba Testing Lab.
Tokin EMC Engineering Co., Ltd.

-- ATTENTION --

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Contents

	<i>Page</i>
1 DESCRIPTION OF DEVICE	1
2 TEST FACILITY.....	2
3 SUMMARY OF RESULTS	
3.1 Electromagnetic Emission	2
3.2 Modifications 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 ~ 12
6.2 RFI Field Strength Measurement	
6.2.1 Measurement Instrumentation Used	13
6.2.2 Measurement Procedure.....	13
6.2.3 Measurement Uncertainty	13
6.2.4 Test Data	14 ~ 19
6.3 Minimum Margin.....	20
6.4 Sample Calculation	20

7 MEASUREMENT PHOTOS

Photo 7.1	Setup with the Maximized Terminal Voltage Emission Level	21
Photo 7.2	Setup with the Maximized RFI Field Strength Emission Level	22

1 DESCRIPTION OF DEVICE

A) Kind of Equipment :	IC Card Reader/Writer
B) FCC ID:	NEEA02
C) Model Name :	M-660A
D) Serial No. :	None
E) Type of Sample Tested :	Pre-production
F) High Frequency Used :	3.5MHz, 7.1MHz (CPU clock for IC Card)
G) Rating Power Supply :	1phase AC120V, 0.8A, 50/60Hz
H) Tested Power Supply :	1phase AC120V, 60Hz
I) Date of Manufacture :	July 2000
J) Manufacturer :	Maxell Seiki Co., Ltd. 45-101, Kagamida, Ohyamazaki-cho, Otokuni-gun, Kyoto-fu, Japan
K) Description of Operating :	· Standby · Read & Write (3.5MHz) · Read & Write (7MHz)
L) Date of Sample Received :	July 28, 2000
M) Test Engineer :	Masayuki Kuramochi

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Masayuki Kuramochi, Engineer

2 TEST FACILITY

The semi anechoic chamber and conducted measurement facility are used for these testing, where are located following address. This chamber was fully described in a report dated Dec.24,1999, that was submitted to the FCC. And we had accepted in a letter dated Feb.7,2000 (31040/SIT). This laboratory is accredited by NVLAP for NVLAP Lab. Code : 200221-0.

Tokin EMC Engineering Co., Ltd.

Tsukuba Testing Laboratory, Semi Anechoic Chamber 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**

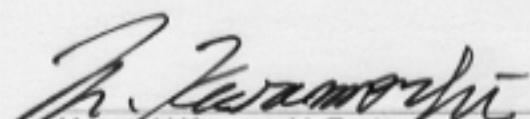
Although the measured emissions indicate that the EUT complies with the required limits, some measurements are close to these limits. When the uncertainty of measurement is considered, there is some possibility that the EUT may not be compliant.

Test results are traceable to JQA, TELEC and NIST.

3.2 Modifications to The EUT : None

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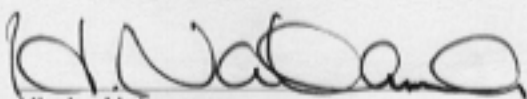

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4 TESTED SYSTEM DETAILS

4.1 Peripherals and Others :

Description	Model Name	Serial No.	Manufacturer	FCC ID
AC Adapter for EUT	WL-12100D Type EI-48	None	Hon-Kwang Electric Co., Ltd.	None
PC	GP6-366C	00637497	Gateway	DoC
CRT Display Monitor	500-069EV	15025E025537	Gateway	BEJCS592
Keyboard	G9900	J213341	Gateway	GYUR61SK
Mouse	1.1A PS/2	0688983-30000	Gateway	C3KKMP5
Microphone	None	None	None	None
Speaker	DS-10P	None	DIATONE	DoC
Printer	BJC-50V	None	Canon	DoC
AC Adapter for Printer	AD-360U	E9803364872	Canon	DoC
Game Controller	Side Winder Precision Pro	X03-57540	Microsoft	DoC

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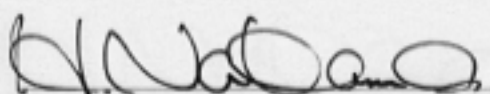


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4.2 Type of Used Cables :

Description	Length	Type of shield	Model name	Manufacturer
① Keyboard cable	1.8m	Shielded	None	Gateway
② Mouse cable	1.9m	Shielded	None	Gateway
③ Game Controller cable	2.0m	Shielded	None	Microsoft
④ Microphone cable	1.8m	Non-shielded	None	None
⑤ Speaker cable	2.0m	Non-shielded	None	DIATONE
⑥ PC AC cable	2.0m	Non-shielded	None	None
⑦ CRT Display Monitor cable	1.8m	Shielded	None	Gateway
⑧ Serial cable	1.4m	Shielded	DE-9P/DE-9S -2560	ITT Cannon
⑨ Printer cable	1.5m	Shielded	None	Canon
⑩ Monitor AC cable	2.6m	Non-shielded	None	None
⑪ EUT AC Adapter cable (DC side)	1.0m	Non-shielded	None	None
⑫ EUT AC Adapter cable (AC side)	1.0m	Non-shielded	None	None
⑬ Printer AC Adapter cable (DC side)	1.5m	Non-shielded	None	Canon
⑭ Printer AC Adapter cable (AC side)	1.0m	Non-shielded	None	Canon

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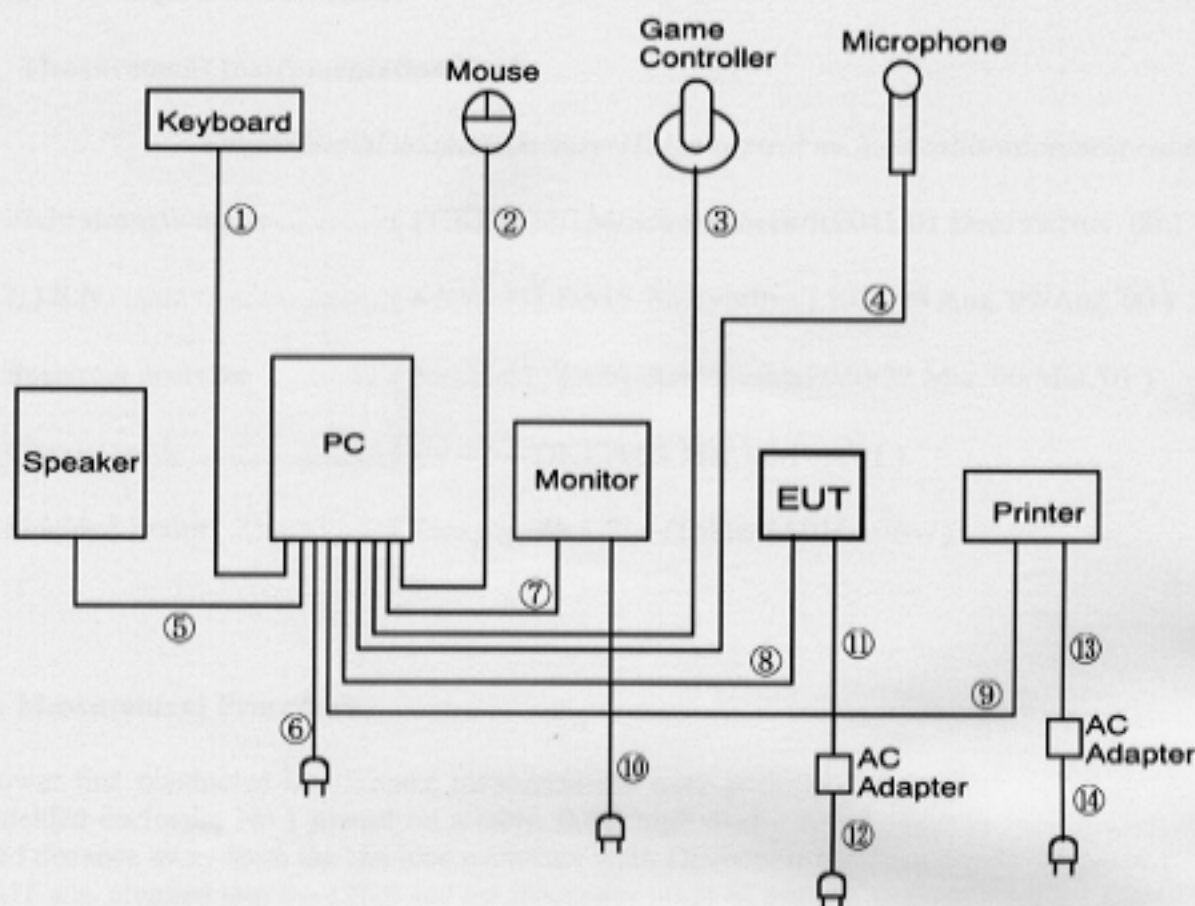


Figure 4-1 System Configuration Diagram

5 TECHNICAL COUNTERMEASURE :

None

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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/LI010/23 Aug.'99/Aug.'00)

Spectrum analyzer (R3131/81781091/Advantest/SP040/23 Mar.'00/Mar.'01)

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

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

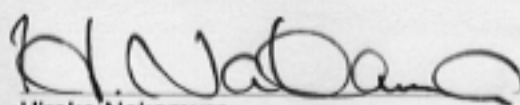
6.1.2 Measurement Procedure

The power line conducted interference measurements were performed according to ANSI C63.4-1992 in a shielded enclosure No.1 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 $\pm 0.6\text{dB}(k=2)$.

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6.1.4 Test Data

Table 6.1-1 RFI Voltage Measurement Results

Operating mode: Standby

Date of measurement: July 28, 2000

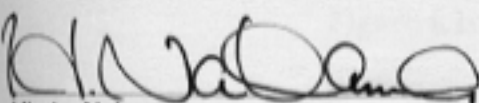
Test procedure: ANSI C63.4-1992

Temperature: 27 degree C

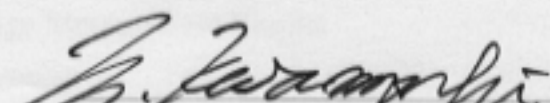
Humidity: 63 %

	Frequency (MHz)	Level (dBμV)	Total Factor(dB)	Result (dBμV)	Result (μV)	Limit (μV)	Margin (dB)
L1-E	4.888	22.0	0.2	22.2	12.88	250	25.8
	5.917	28.0	0.2	28.2	25.70	250	19.8
	6.916	32.0	0.2	32.2	40.74	250	15.8
	7.945	31.0	0.3	31.3	36.73	250	16.7
	10.140	26.0	0.3	26.3	20.65	250	21.7
	25.470	38.0	0.6	38.6	85.11	250	9.4
N-E	4.888	23.0	0.4	23.4	14.79	250	24.6
	5.917	28.0	0.4	28.4	26.30	250	19.6
	6.916	31.0	0.4	31.4	37.15	250	16.6
	7.945	30.0	0.5	30.5	33.50	250	17.5
	10.140	25.0	0.5	25.5	18.84	250	22.5
	25.470	39.5	1.0	40.5	105.93	250	7.5

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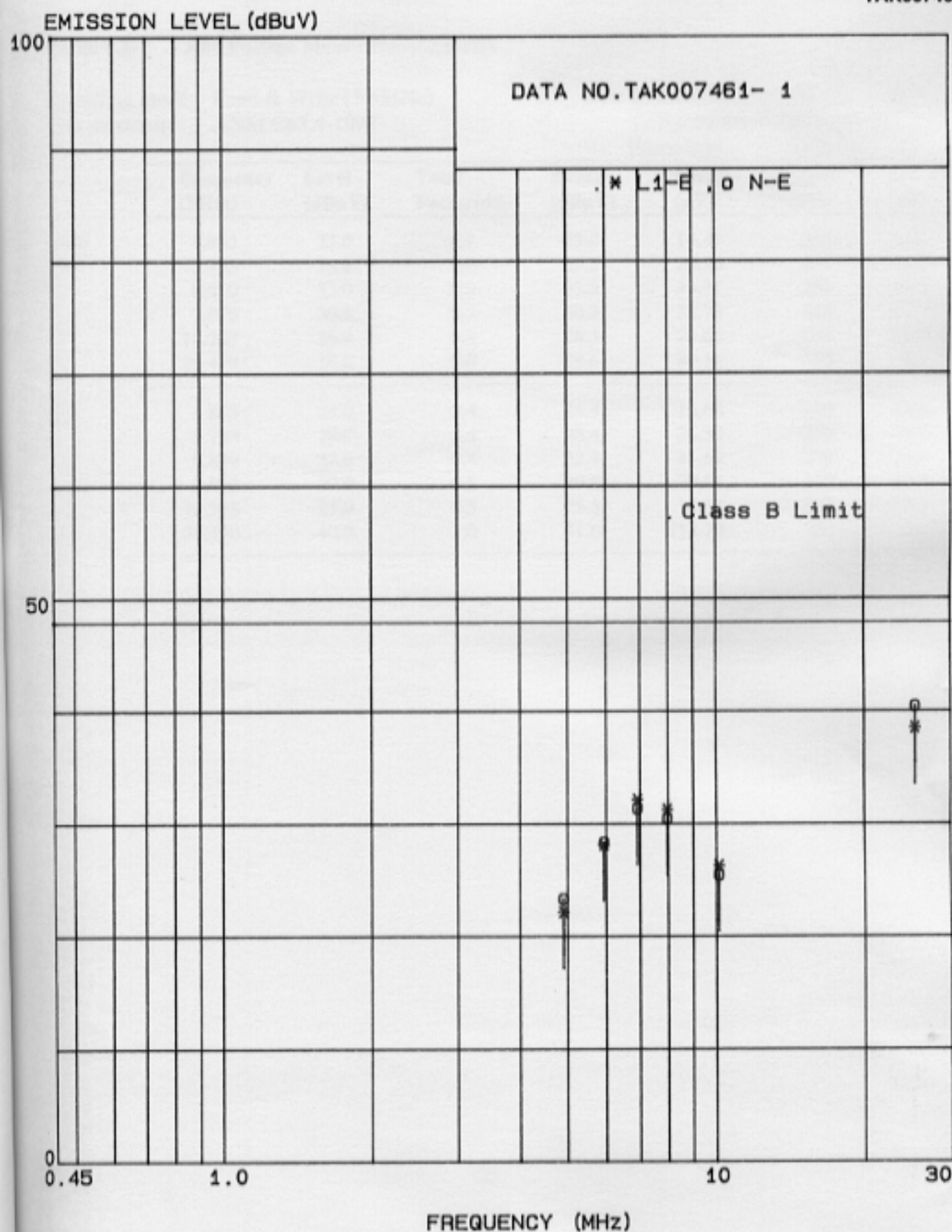


Figure 6.1-1 RFI Voltage Measurement Results

Table 6.1-2 RFI Voltage Measurement Results

Operating mode: Read & Write (3.5MHz)

Date of measurement: July 28, 2000

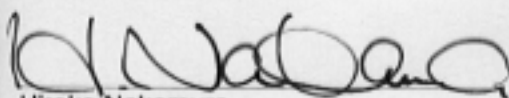
Test procedure: ANSI C63.4-1992

Temperature: 27 degree C

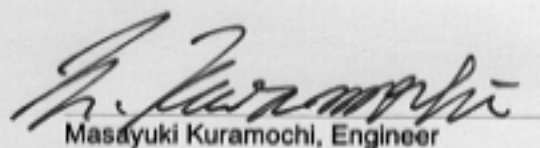
Humidity: 63 %

	Frequency (MHz)	Level (dBμV)	Total Factor(dB)	Result (dBμV)	Result (μV)	Limit (μV)	Margin (dB)
L1-E	4.853	23.0	0.2	23.2	14.45	250	24.8
	5.753	28.0	0.2	28.2	25.70	250	19.8
	6.850	33.0	0.2	33.2	45.71	250	14.8
	7.876	30.0	0.3	30.3	32.73	250	17.7
	10.343	26.0	0.3	26.3	20.65	250	21.7
	25.470	38.0	0.6	38.6	85.11	250	9.4
N-E	4.853	24.0	0.4	24.4	16.60	250	23.6
	5.753	28.0	0.4	28.4	26.30	250	19.6
	6.850	32.0	0.4	32.4	41.69	250	15.6
	7.876	29.0	0.5	29.5	29.85	250	18.5
	10.343	25.0	0.5	25.5	18.84	250	22.5
	25.470	40.0	1.0	41.0	112.20	250	7.0

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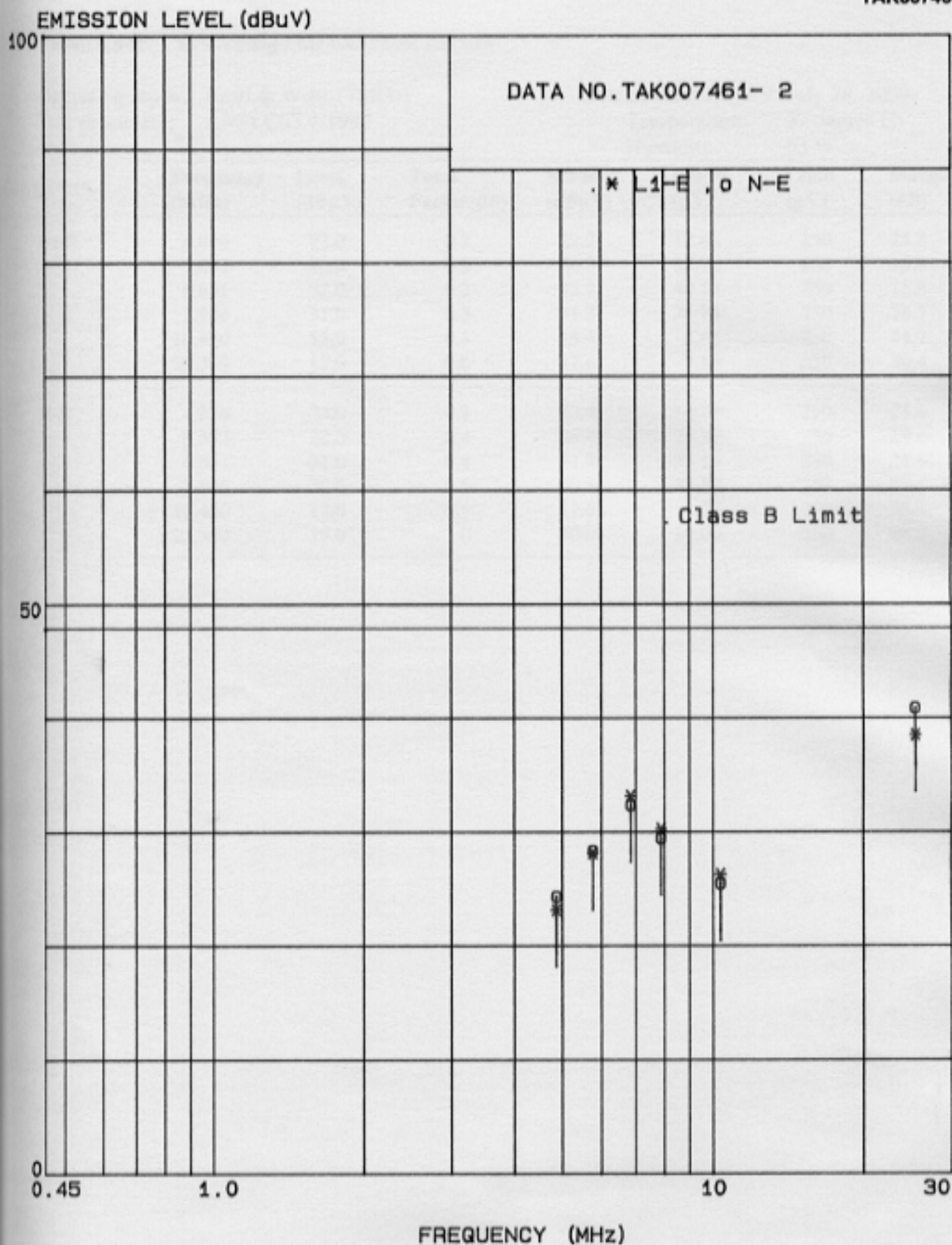


Figure 6.1-2 RFI Voltage Measurement Results

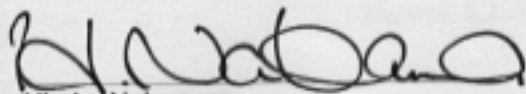
Table 6.1-3 RFI Voltage Measurement Results

Operating mode: Read & Write (7MHz)
 Test procedure: ANSI C63.4-1992

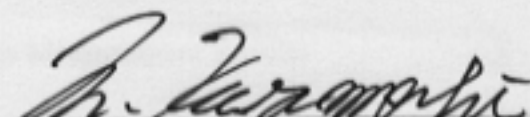
Date of measurement: July 28, 2000
 Temperature: 27 degree C
 Humidity: 63 %

	Frequency (MHz)	Level (dB μ V)	Total Factor(dB)	Result (dB μ V)	Result (μ V)	Limit (μ V)	Margin (dB)
LI-E	4.856	22.0	0.2	22.2	12.88	250	25.8
	5.852	28.0	0.2	28.2	25.70	250	19.8
	6.851	32.0	0.2	32.2	40.74	250	15.8
	7.946	31.0	0.3	31.3	36.73	250	16.7
	10.450	13.0	0.3	13.3	4.63	250	34.7
	25.350	17.0	0.6	17.6	7.59	250	30.4
N-E	4.856	23.0	0.4	23.4	14.79	250	24.6
	5.852	28.0	0.4	28.4	26.30	250	19.6
	6.851	31.0	0.4	31.4	37.15	250	16.6
	7.946	30.0	0.5	30.5	33.50	250	17.5
	10.450	12.0	0.5	12.5	4.22	250	35.5
	25.350	19.0	1.0	20.0	10.00	250	28.0

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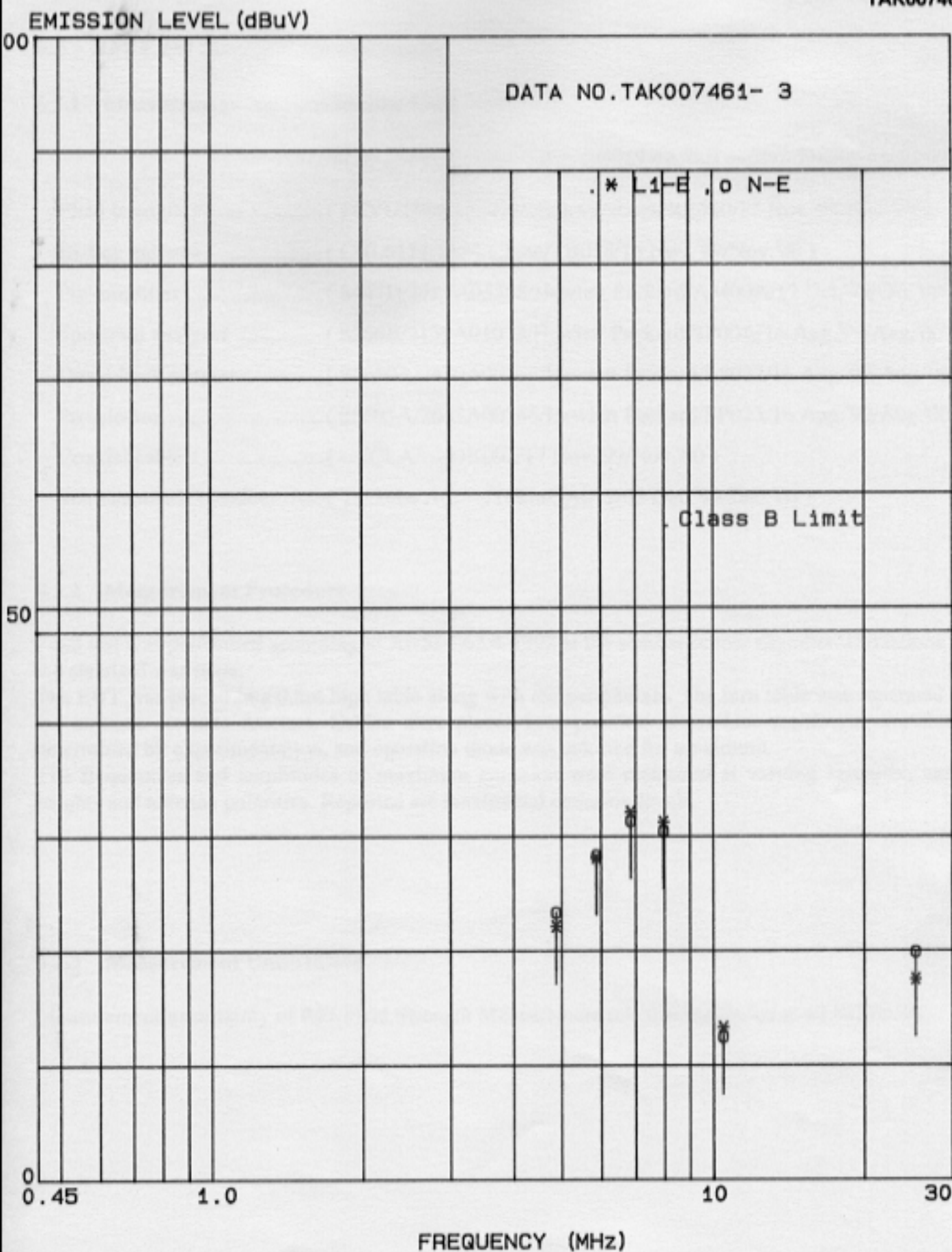


Figure 6.1-3 RFI Voltage Measurement Results

6.2 RFI Field Strength Measurement

6.2.1 Measurement Instrumentation Used

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

Field strength meter (FCVU1534/1534118/Schwarzbeck/RE040/17 Nov.'99/Nov.'00)
 Bi-Log antenna..... (CBL6111/1154/Chase/TB018/16 Nov.'99/Nov.'00)
 Pre-amplifier (8447D/2727A05358/Hewlett Packard/AM00A/12 Oct.'99/Oct.'00)
 Spectrum analyzer (8566B/2139A01073/Hewlett Packard/SP00A/16 Aug.'99/Aug.'00)
 Quasi-Peak adapter (85650A/2430A00566/Hewlett Packard/SP022/16 Aug.'99/Aug.'00)
 Preselector (85685A/2645A00366/Hewlett Packard/SP023/16 Aug.'99/Aug.'00)
 Coaxial cable..... (---/CLA/---/DK092/17 Nov.'99/Nov.'00)
 Semi anechoic chamber (Tsukuba AC/---/Tokin/SA012/03 Dec.'99/Dec.'00)

6.2.2 Measurement Procedure

Final test was performed according to ANSI C63.4-1992 at the semi anechoic chamber. Deviations from the standard was none.

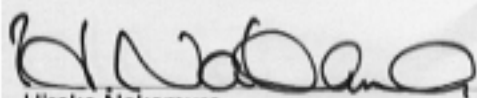
The EUT was placed in a 0.8m high table along with the peripherals. The turn table was separated from the antenna distance 3meters. Cables were placed in a position to produce maximum emissions as determined by experimentation, and operation mode was selected for maximum.

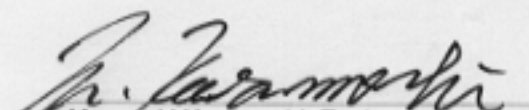
The frequencies and amplitudes of maximum emission were measured at varying azimuths, antenna heights and antenna polarities. Reported are maximized emission levels.

6.2.3 Measurement Uncertainty

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

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6.2.4 Test Data

Table 6.2-1 RFI Field Strength Measurement Results

Operating mode: Standby

Date of measurement: July 28, 2000

Test procedure: ANSI C63.4-1992

Temperature: 22 degree C

Humidity: 65 %

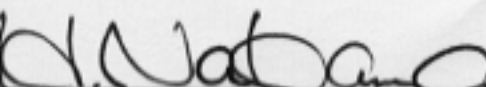
Margin (MHz)	Frequency Level			Ant. Loss (dB)	Cable Gain (dB)	Amp.		Result		Result Limit (μ V/m)	10 Meter	
	Ver. (dB μ V)	Hor. (dB/m)	Factor (dB/m)			Ver. (dB μ V/m)	Hor. (dB μ V/m)	Ver. (μ V/m)	Hor. (μ V/m)		Ver. (dB)	Hor. (dB)
43.80	47.0	-	12.5	1.8	27.7	33.6	-	47.86	-	100	6.4	-
50.00	47.0	-	9.0	1.8	27.5	30.3	-	32.73	-	100	9.7	-
66.45	-	49.0	5.3	2.3	27.6	-	29.0	-	28.18	100	-	11.0
85.03	44.0	-	8.3	2.5	27.7	27.1	-	22.65	-	100	12.9	-
232.20	-	43.0	9.2	4.7	27.0	-	29.9	-	31.26	200	-	16.1
265.55	34.0	-	12.6	5.2	26.8	25.0	-	17.78	-	200	21.0	-
282.72	-	41.0	13.6	5.3	26.9	-	33.0	-	44.67	200	-	13.0
431.68	-	39.0	17.3	6.8	27.7	-	35.4	-	58.88	200	-	10.6
432.24	41.0	-	17.3	6.8	27.8	37.3	-	73.28	-	200	8.7	-
464.17	45.0	-	17.2	7.1	28.0	41.3	-	116.14	-	200	4.7	-
464.76	-	43.0	17.2	7.1	28.0	-	39.3	-	92.26	200	-	6.7
658.72	-	33.0	20.6	8.5	28.4	-	33.7	-	48.42	200	-	12.3
729.76	30.0	-	21.3	9.0	28.1	32.2	-	40.74	-	200	13.8	-

Class B limit

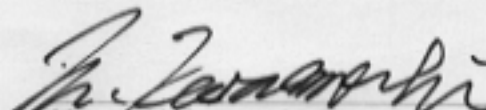
Radiated Emission – 3 meter distance

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

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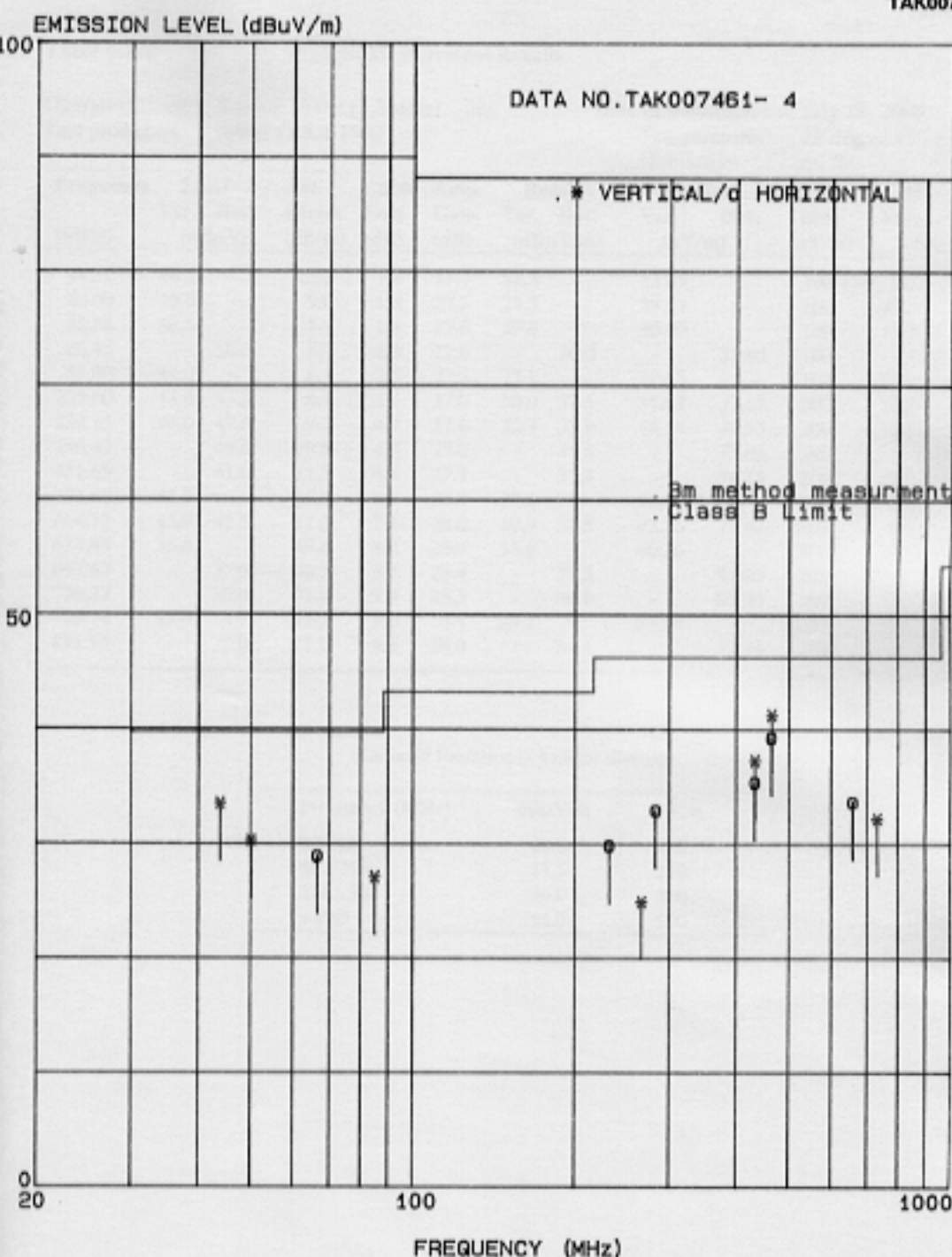


Figure 6.2-1 RF Field Strength Measurement Results

Table 6.2-2 RFI Field Strength Measurement Results

Operating mode: Read & Write (3.5MHz)

Date of measurement: July 28, 2000

Test procedure: ANSI C63.4-1992

Temperature: 22 degree C

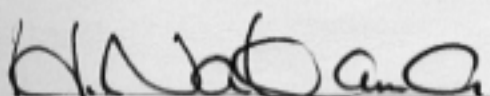
Humidity: 65 %

Frequency (MHz)	Level		Ant. Factor (dB/m)	Cable Loss (dB)	Amp. Gain (dB)	Result		Result		10 Meter Limit (μV/m)	Margin	
	Ver.	Hor.				Ver.	Hor.	Ver.	Hor.		Ver.	Hor.
	(dBμV)					(dBμV/m)		(μV/m)			(dB)	
44.32	46.5	-	12.2	1.8	27.7	32.8	-	43.65	-	100	7.2	-
50.00	46.0	-	9.0	1.8	27.5	29.3	-	29.17	-	100	10.7	-
53.58	48.5	-	7.1	1.8	27.6	29.8	-	30.90	-	100	10.2	-
66.45	-	50.0	5.3	2.3	27.6	-	30.0	-	31.62	100	-	10.0
85.00	44.0	-	8.3	2.5	27.7	27.1	-	22.65	-	100	12.9	-
225.00	44.0	45.5	8.5	4.5	27.0	30.0	31.5	31.62	37.58	200	16.0	14.5
232.15	46.0	47.0	9.2	4.7	27.0	32.9	33.9	44.16	49.55	200	13.1	12.1
246.43	-	49.0	10.8	4.8	27.0	-	37.6	-	75.86	200	-	8.4
431.65	-	41.0	17.3	6.8	27.7	-	37.4	-	74.13	200	-	8.6
432.65	43.0	-	17.3	6.9	27.8	39.4	-	93.33	-	200	6.6	-
464.75	43.0	41.5	17.2	7.1	28.0	39.3	37.8	92.26	77.62	200	6.7	8.2
617.83	36.0	-	19.8	8.2	28.4	35.6	-	60.26	-	200	10.4	-
663.67	-	37.0	20.7	8.5	28.4	-	37.8	-	77.62	200	-	8.2
729.23	-	36.0	21.4	9.0	28.3	-	38.1	-	80.35	200	-	7.9
729.74	33.0	-	21.3	9.0	28.1	35.2	-	57.54	-	200	10.8	-
811.15	-	32.0	21.1	9.3	28.0	-	34.4	-	52.48	200	-	11.6

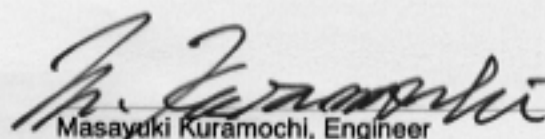
Radiated Emission – 3 meter distance

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

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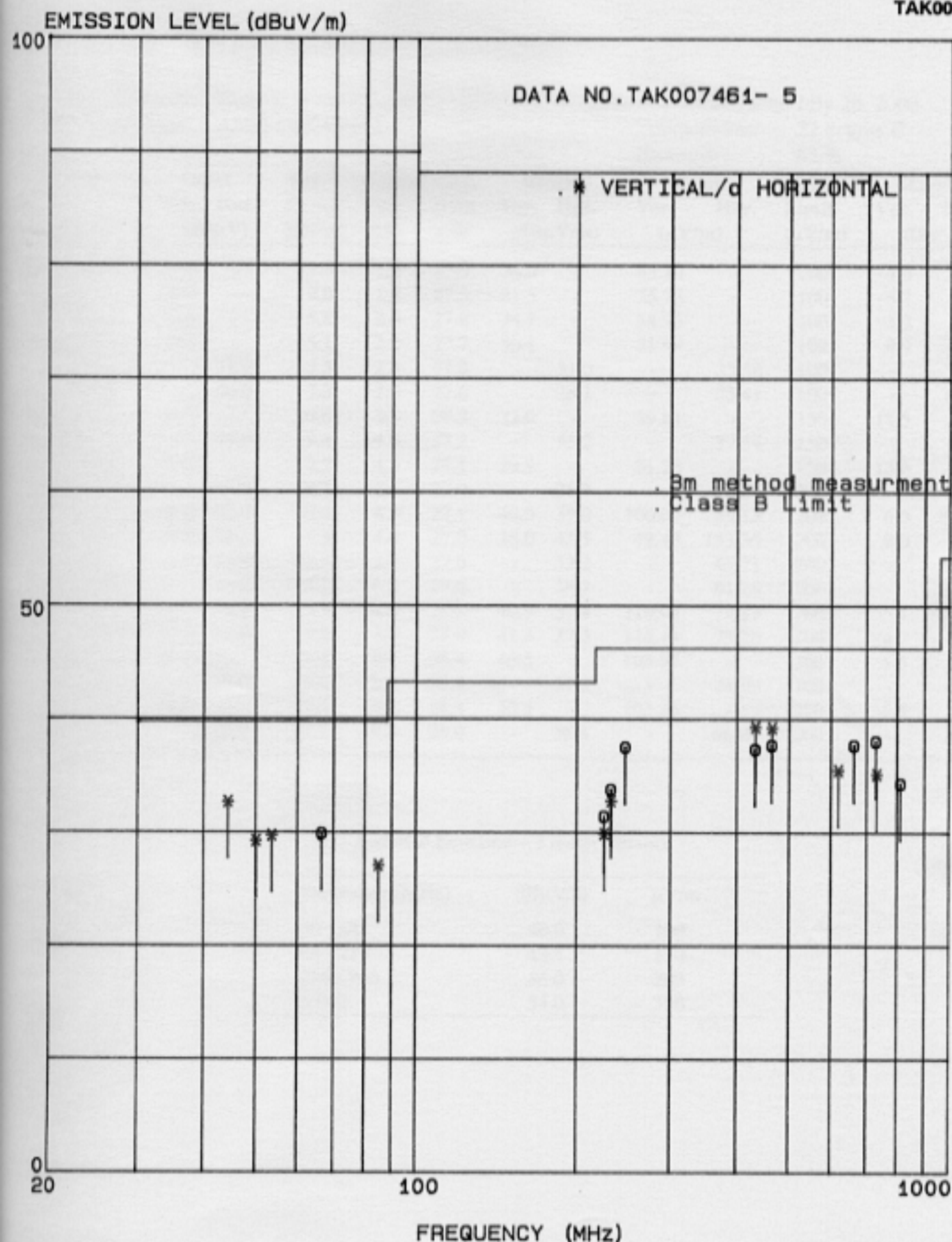


Figure 6.2-2 RFI Field Strength Measurement Results

Table 6.2-3 RFI Field Strength Measurement Results

Operating mode: Read & Write (7MHz)
Test procedure: ANSI C63.4-1992

Date of measurement: July 28, 2000

Temperature: 22 degree C

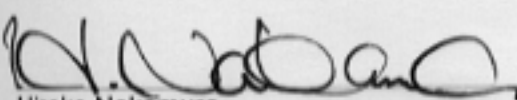
Humidity: 65 %

Frequency (MHz)	Level		Ant. Factor (dB/m)	Cable Loss (dB)	Amp. Gain (dB)	Result		Result		10 Meter Limit (μ V/m)	Margin	
	Ver.	Hor.				Ver.	Hor.	Ver.	Hor.		Ver.	Hor.
	(dB μ V)					(dB μ V/m)		(μ V/m)			(dB)	
44.65	50.0	-	12.0	1.8	27.8	36.0	-	63.10	-	100	4.0	-
50.00	48.0	-	9.0	1.8	27.5	31.3	-	36.73	-	100	8.7	-
56.85	54.5	-	5.8	2.0	27.6	34.7	-	54.33	-	100	5.3	-
64.28	50.5	-	5.1	2.2	27.7	30.1	-	31.99	-	100	9.9	-
66.45	-	51.0	5.3	2.3	27.6	-	31.0	-	35.48	100	-	9.0
78.45	-	46.0	7.3	2.4	27.6	-	28.1	-	25.41	100	-	11.9
147.55	45.0	-	10.8	3.5	27.3	32.0	-	39.81	-	150	11.5	-
178.55	-	49.0	9.4	4.0	27.2	-	35.2	-	57.54	150	-	8.3
207.14	45.0	-	7.7	4.3	27.1	29.9	-	31.26	-	150	13.6	-
221.41	-	51.0	8.2	4.5	27.0	-	36.7	-	68.39	200	-	9.3
235.71	53.0	52.0	9.6	4.5	27.1	40.0	39.0	100.00	89.13	200	6.0	7.0
250.00	49.0	53.5	11.2	4.8	27.0	38.0	42.5	79.43	133.35	200	8.0	3.5
316.95	-	41.0	13.5	5.7	27.0	-	33.2	-	45.71	200	-	12.8
350.00	-	45.0	14.2	6.0	27.0	-	38.2	-	81.28	200	-	7.8
431.65	44.5	41.0	17.3	6.8	27.7	40.9	37.4	110.92	74.13	200	5.1	8.6
464.75	45.0	41.0	17.2	7.1	28.0	41.3	37.3	116.14	73.28	200	4.7	8.7
614.24	41.0	-	19.8	8.1	28.4	40.5	-	105.93	-	200	5.5	-
614.25	-	38.0	19.8	8.1	28.4	-	37.5	-	74.99	200	-	8.5
628.55	40.5	-	19.9	8.2	28.4	40.2	-	102.33	-	200	5.8	-
811.15	-	34.0	21.1	9.3	28.0	-	36.4	-	66.07	200	-	9.6

Radiated Emission – 3 meter distance

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

Report processed by



Hiroko Nakamura
25/Aug./2000



Masayuki Kuramochi, Engineer

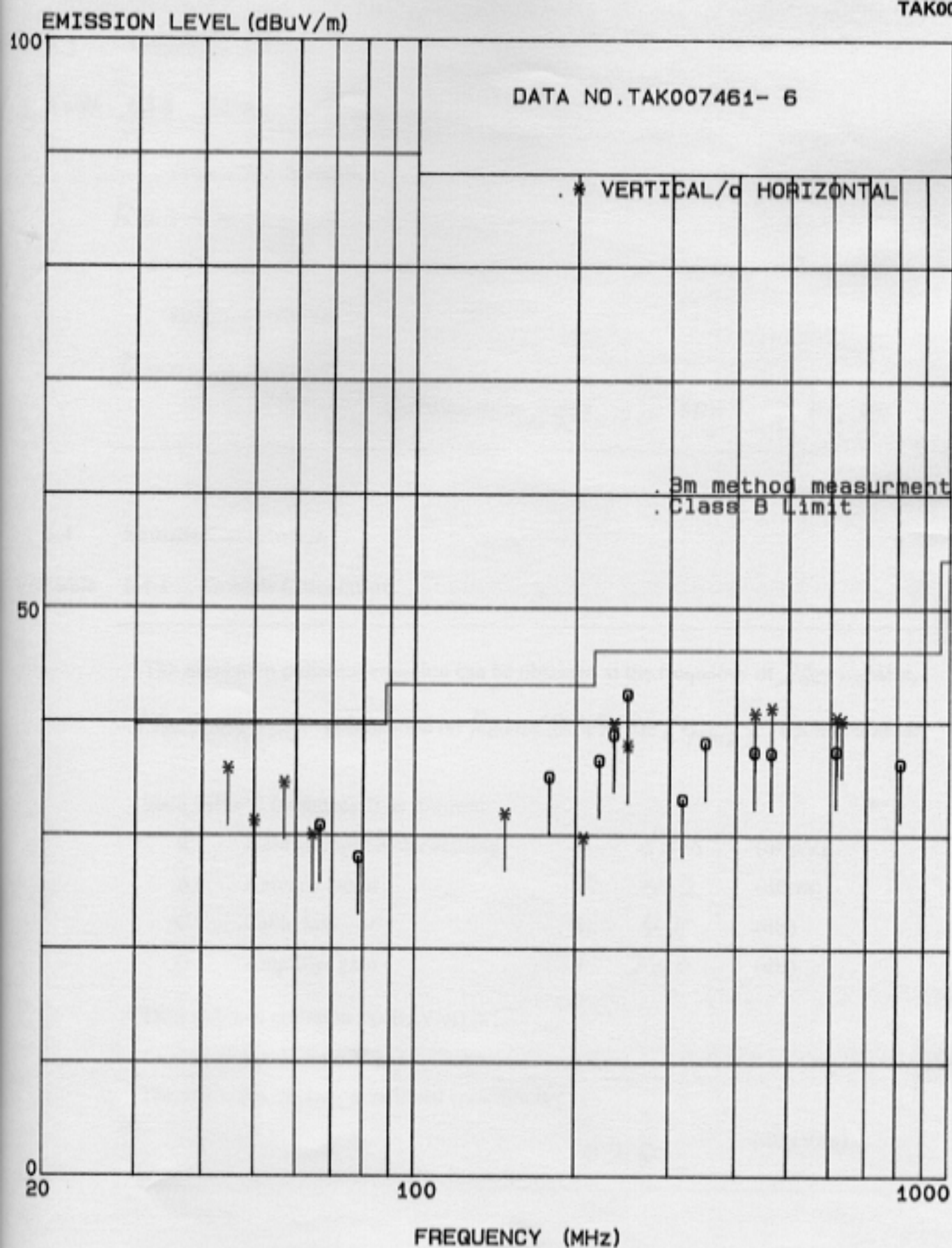


Figure 6.2-3 RFI Field Strength Measurement Results

6.3 Minimum Margin

Table 6.3-1 Minimum Margin

Conducted emission

Read & Write
(3.5 MHz)

operation mode 25.470 MHz, 7.0 dB

Radiated emission

Read & Write
(7 MHz)

operation mode 250.00 MHz, 3.5 dB

6.4 Sample Calculation

Table 6.4-1 Sample Calculation

The maximum radiating emission can be obtained at the frequency of 250.00 MHz,

Horizontal polarization on Read & Write (7 MHz) operation mode.

Each value at frequency is as follows;

R :	Field strength meter reading	=	53.5	(dBμV)
A :	Antenna factor	=	11.2	(dB/m)
C :	Cable loss	=	4.8	(dB)
G :	Amplifier gain	=	27.0	(dB)

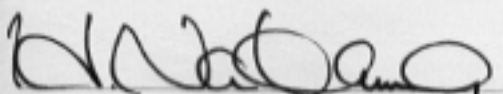
Then radiated emission E(dBμV/m) is ;

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

Therefore, the maximum radiated emission is ;

42.5 (dBμV/m)

Report processed by



Hiroko Nakamura
25/Aug./2000


Masayuki Kuramochi, Engineer

7 MEASUREMENT PHOTOS

Photo 7.1 Setup with the Maximized RFI Voltage Emission Level



CONFIRMATION



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Photo 7.2 Setup with the Maximized RFI Field Strength Emission Level



CONFIRMATION



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