COSMOS

NVLAP LAB CODE: 200151-0

Test Report No. E19670

MEASUREMENT/TECHNICAL REPORT
FCC PART 15, Class B (ANSI C63.4:1992)

Issued: April 2, 1998

Name and Address of: the Client	Matsushita Electric Industrial Co., Ltd. 6-4-1 Tsujidomotomachi, Fujisawa-shi, Kanagawa-ken, 251-0043 Japan
Phone / Fax	0466-34-3111 / 0466-35-5557
Test Item:	17 Inch Color CRT Display Monitor
FCC ID:	ACJ93312131
Identification:	TX-D7S54NM, TX-D7S54, TX-D7S54**, CD4095A/02
Serial No.:	FP8150024
Sample No.:	1
Sample Receipt Date:	March 28, 1998
Test Result:	PASS

Report Prepared by:
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Tested by: Hiroshi Wakabayashi — H. Wakabayashi — April 2, 1998 — Date

Reviewed by: K. SHIBATA — K. Shibata — April. 2. 1998 — Date

Note:
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3. All measurement data contained in this report may have uncertainty. A judgement for the Limitation should be taken into the count. Refer to the Appendix for the model calculation.

1. General Information

1.1 Product Description

The Matsushita Electric Industrial Co., Ltd., Model VCDTS21419-** (TX-D7S54NM, TX-D7S54, TX-D7S54**, CD4095A/02) (referred to as the EUT in this report) is a 17 Inch Color CRT Display Monitor.

Rated input voltage is AC 120V.

EUT is featuring a 8 MHz processor.

1.2 Related Submittal(s)/Grant(s)

Related Submittal Grant is not conered in this report.

1.3 Tested System Details

The FCC IDs for all equipment, plus descriptions of all cables used in the tested system(including inserted cards, which have grants) are:

Model No.	Serial No.	FCC ID	Description	Cable Description
TX-D7S54NM, TX-D7S54, TX-D7S54**, CD4095A/02	FP8150024	ACJ93312131 (Doc)	EUT (17 Inch Color CRT Display Monitor)	AC Power Cord 1.8m Unshielded Video I/F Cable 1.8m Shielded
D4553A	SG73100685	Doc	Personal Computer	AC Power Cord 2.3m Unshielded
C4565A	SG73I140TZ	B94C4555X	Printer	AC Power Cord 1.8m Unshielded Printer Cable 3.0m Shielded
FKB8724-501	L1009563	C9SKB8720	Keyboard	Keyboard I/F Cable 2.3m Shielded
M-S34	LZA72407952	DZL211029	Mouse	Mouse I/F Cable 1.85m Shielded
5300AM	A2175300K306	BFJ5300AM	Modem	Modem I/F Cable 1.85m Shielded
T41-090800-A01	None	BFJ5300AM	AC Adaptor	AC Power Cord 1.9m Unshielded

2. System Test Configuration

2.1 Justification

EUT was measured by max radiation mode user specified.
The measurement was conducted for the resolution 1600×1200 and 640×480 and Video I/F Cable (D-Sub = D-Sub) length 1.5m and 1.8m and 2.7m and 3.0m and Video I/F Cable (D-Sub = BNC) length 1.8m.

Following is the worst condition:

Conducted Emission:	1600×1200 (Dot Clock Frequency: 202.5 MHz, Horizontal Frequency: 93.7 kHz, Vertical Frequency: 75.0 Hz) Cable: 1.8m length (D-Sub = BNC)
Radiated Emission:	1600×1200 (Dot Clock Frequency: 202.5 MHz, Horizontal Frequency: 93.7 kHz, Vertical Frequency: 75.0 Hz) Cable: 1.8m length (D-Sub = BNC)

2.2 EUT Exercise Software

EUT did not exercise program during radiated and conducted testing.

2.3 Special Accessories

This cable model and part numbers are instructed with their installation manual.

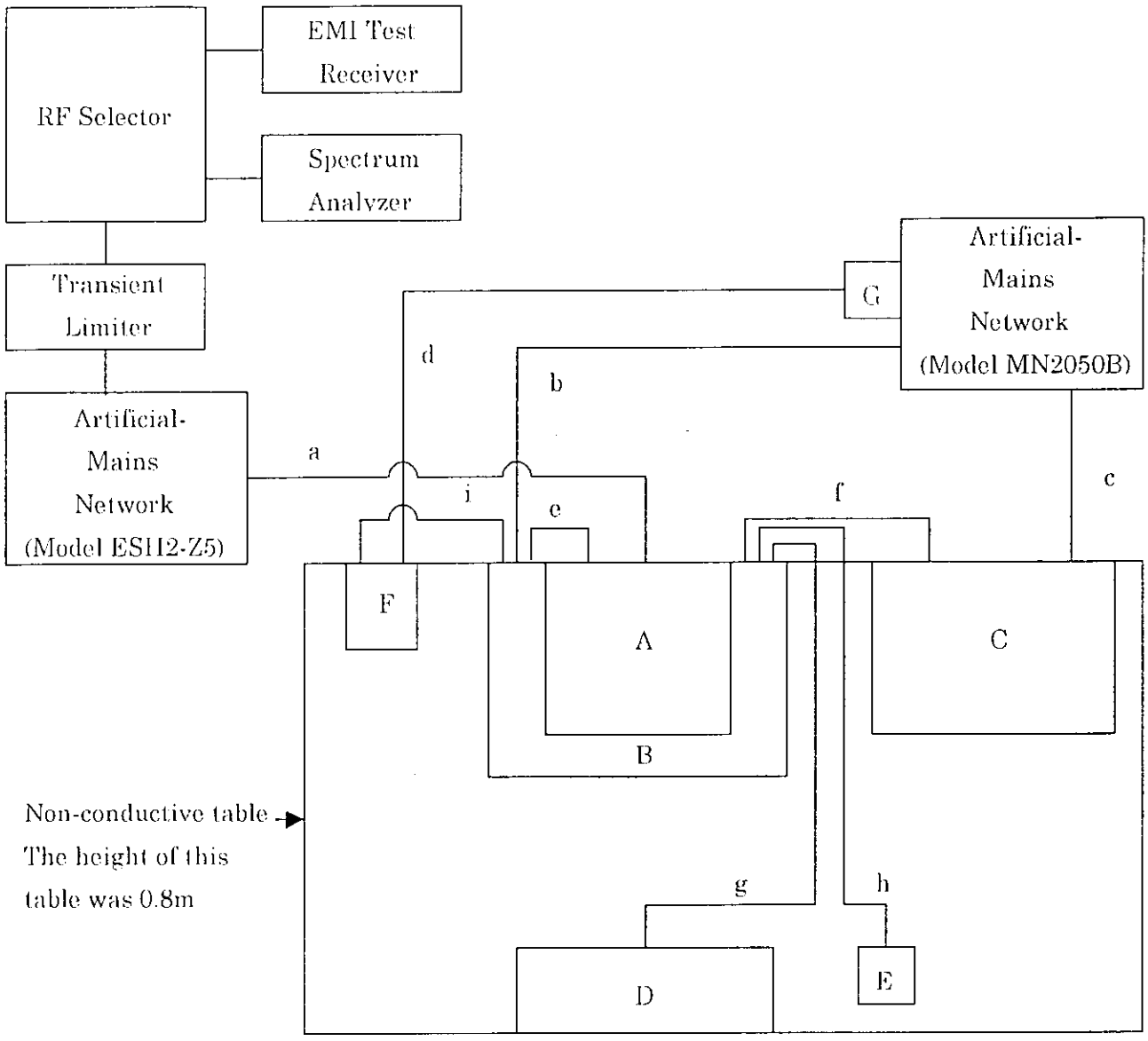
2.4 Equipment Modifications

No equipment modification to achieve compliance to Class B levels was done during test.

2. System Test Configuration (Continued)

2.5 Configuration of Tested System (Continued)

Conducted Emission



2. System Test Configuration (Continued)

2.5 Configuration of Tested System (Continued)

Conducted Emission

1) EUT is put on the Personal Computer.
2) Personal Computer and Printer located at 0.1m intervals.
3) Personal Computer and Modem located at 0.1m intervals.
4) Keyboard and Mouse located at 0.1m intervals.
5) EUT is connected to Artificial-Mains Network (Model ESH2-Z5) by the AC Power Cord.
   Extended Cord was folded at the center of Cord by 0.4m length.
   and the Cord was hung in the middle between ground and table.
6) Personal Computer is connected to Artificial-Mains Network (Model MN2050B)
   by the AC Power Cord.
   Extended Cord was folded at the center of Cord by 0.4m length.
   and the Cord was hung in the middle between ground and table.
7) Printer is connected to Artificial-Mains Network (Model MN2050B) by the AC Power Cord.
   Extended Cord was folded at the center of Cord by 0.35m length.
   and the Cord was hung in the middle between ground and table.
8) AC Adaptor is connected to Artificial-Mains Network (Model MN2050B).
9) Modem is connected to AC Adaptor by the AC Power Cord.
   Extended Cord was folded at the center of Cord by 0.4m length.
   and the Cord was hung in the middle between ground and table.
10) EUT is connected to Personal Computer by the Video I/F Cable.
    Extended Cable was folded at the center of Cable by 0.4m length.
    and the Cable was hung in the middle between ground and table.
11) Personal Computer is connected to Printer by the Printer Cable.
    Extended Cable was folded at the center of Cable by 0.4m length.
    and the Cable was hung in the middle between ground and table.
12) Personal Computer is connected to Keyboard by the Keyboard I/F Cable.
13) Personal Computer is connected to Mouse by the Mouse I/F Cable.
14) Personal Computer is connected to Modem by the Modem I/F Cable.
    Extended Cable was folded at the center of Cable by 0.4m length.
    and the Cable was hung in the middle between ground and table.

4. Conducted Emission Data

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

		Frequency (MHz)	Measured * (dB μ V)	Limit (dB μ V)
Neutral	Line	0.46970	38.3	48.0
Neutral	Line	0.56160	34.1	48.0
Neutral	Line	0.65607	31.9	48.0
Neutral	Line	0.75150	28.0	48.0
Neutral	Line	0.84558	28.9	48.0
Neutral	Line	27.71814	40.6	48.0
L	Line	0.46909	35.2	48.0
L	Line	0.56152	34.1	48.0
L	Line	0.65517	29.8	48.0
L	Line	0.84449	29.7	48.0
L	Line	15.54551	33.3	48.0
L	Line	27.71775	39.1	48.0

* All readings are quasi-peak unless stated otherwise.

Environment:

Temperature 19 ℃
Humidity 55 %

Tested Personnel:

Tester Signature Hiroshi Wakabayashi

Typed/Printed Name Hiroshi Wakabayashi

5. Radiated Emission Data (Continued)

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF +CF – AG

where FS = Field Strength

RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor
AG = Amplifier Gain

Assume a receiver reading of 52.5 dBuV is obtained. The Antenna Factor of 7.4 and a Cable Factor of 1.1 is added. The Amplifier Gain of 29 dB is subtracted, giving a field strength of 32 dBuV/m. The 32 dBuV/m value was mathematically converted to its corresponding level in uV/m.

FS = 52.5+ 7.4 + 1.1 – 29 =32 dBuV/m

Level in uV/m = Common Antilogarithm [(32 dBuV/m)/20] = 39.8 uV/m

7. The Treatment of Uncertainty In EMC Measurement

Uncertainty Budget

CONTENTS . . . . . Page

SECTION

7.1 Radiated Emission (Continued)

Calculation for 10m biconical Logperiodic antenna, positive value:

$$u_c\ [y] = \sqrt{\left(\frac{1.0}{2}\right)^2 + \left(\frac{0.5}{2}\right)^2 + \frac{1.5^2 + 0.3^2 + 2.2^2 + 0.2^2 + 0.2^2 + 0.4^2 + 1.5^2}{3} + \frac{1.1^2}{2} + 0.5^2}$$

k=2:

$$U = 2\ u_c\ [y] = 2 \times \pm 2.09 = \pm 4.18\ \text{dB}$$

8. Attachment

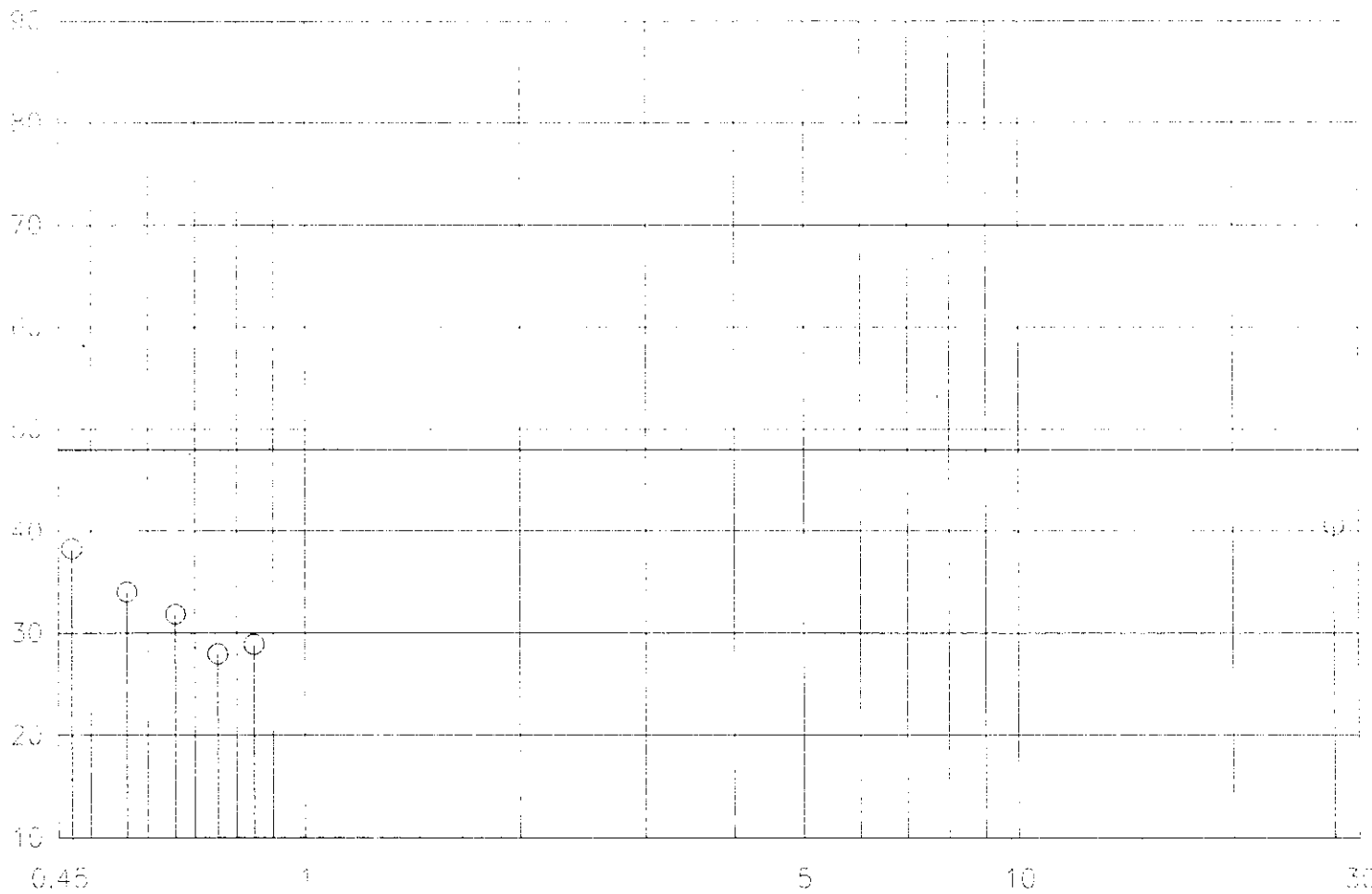
- User Manual

COSMOS Corp. <<< Conducted Emission >>> Date: 31 March, 1998

EMC data

Mode : VCDTS21419-xx
Serial No. : P981500024
Memories : 1600 x 1200
fH: 93.7 kHz, fV: 75 Hz
Video / Cable (D-Sub-BNC) : 1.8m length

Standard : FCC Part 15 Class B
Operator : H.Wakabayashi



********** COSMOS Corp. **********

<<< Conducted Emission >>>

31 March,1998 19:06

Model : VCDTS21419-**
Serial No. : FP8150024
Standard : FCC Part 15 Class B
Condition File : FCC-B
: Operated ("H" Pattern)
Remark : 1600 x 1200
: fH: 93.7 kHz, fV: 75 Hz
: Video I/F Cable (D-Sub=BNC) : 1.8m length
AC Power : 120 V 60 Hz
Temperature : 19 deg.
Humidity : 55 %
Operator : H.Wakabayashi

****

----- Results -----

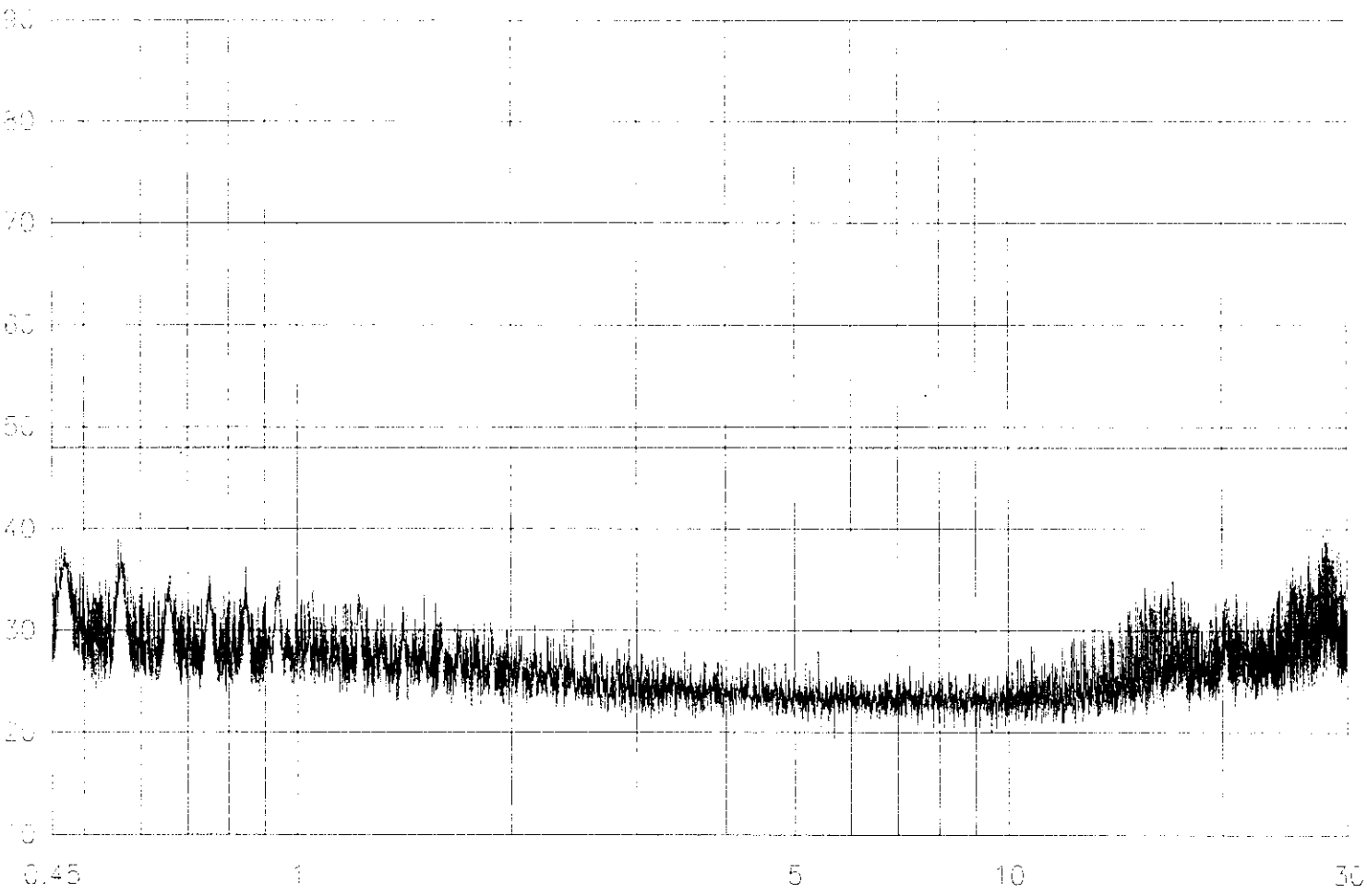
No.	Frequency [MHz]	Reading [dBuV]	c.f. [dB]	Result [dBuV]	Limit [dBuV]	Margin [dB]
Phase L1						
1	0.46909	24.4	10.8	35.2	48.0	12.8
2	0.56152	23.3	10.8	34.1	48.0	13.9
3	0.65517	19.1	10.7	29.8	48.0	18.2
4	0.84449	19.0	10.7	29.7	48.0	18.3
5	15.54551	22.1	11.2	33.3	48.0	14.7
6	27.71775	26.2	12.9	39.1	48.0	8.9

COSMOS Corp.
EMC Lab.

<<< Conducted Emission >>>

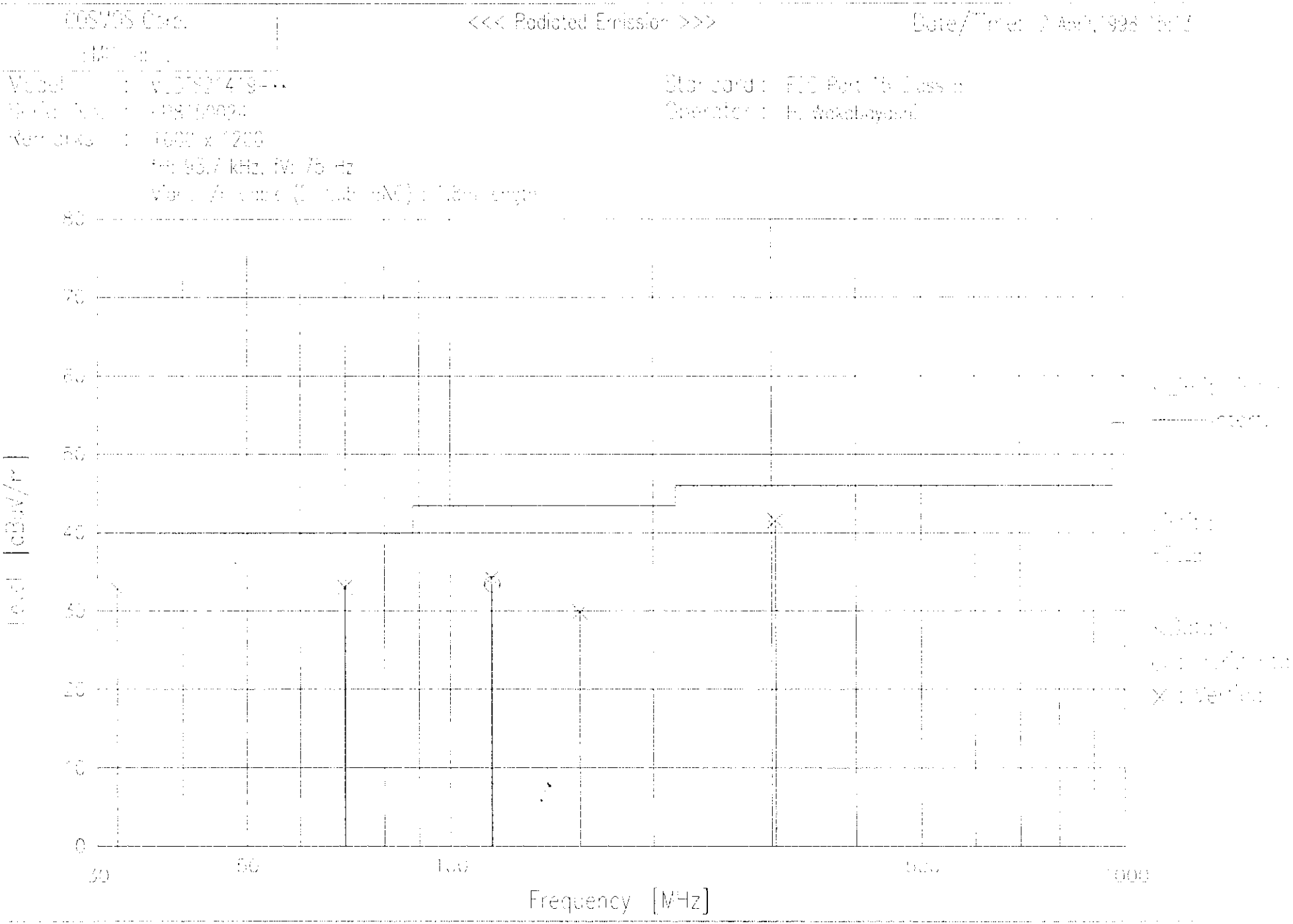
Date/Time : 5th March, 1997 11:21

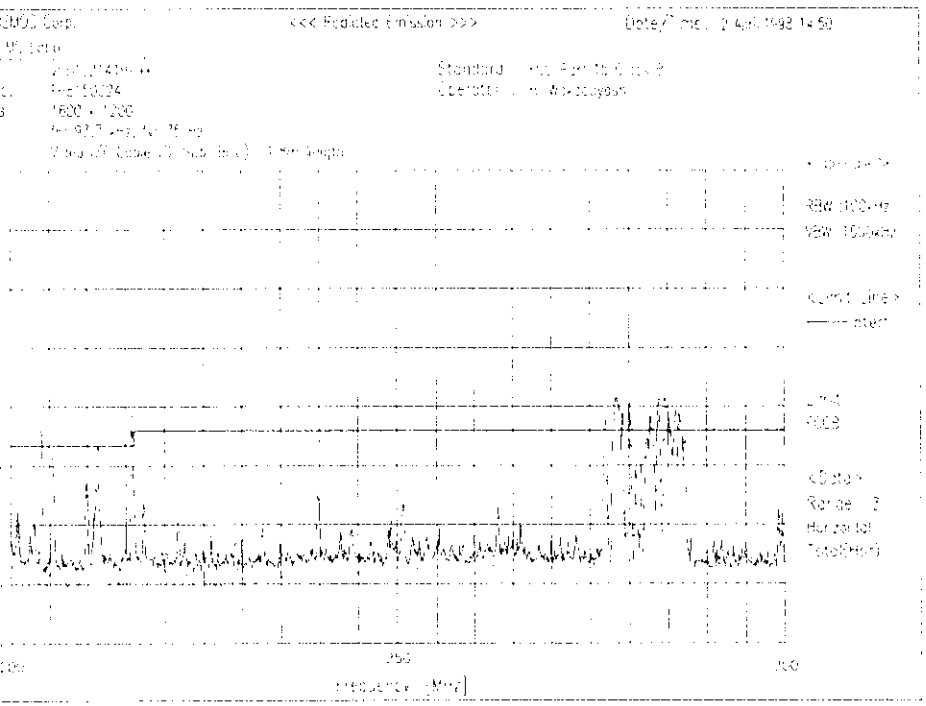
Voos : VCCS21419 ver
Serial No. : EP8150024
Temp/Hum : 20deg x 42%
Standard : FCC Part 15 Class B
Operator : H.Wakabayashi
Test Mode : Mode 1
Note : 9.6/ kHz, VB: 25 Hz
Wire : I/F Cable 10 Cable (BNC) : 1.8m length

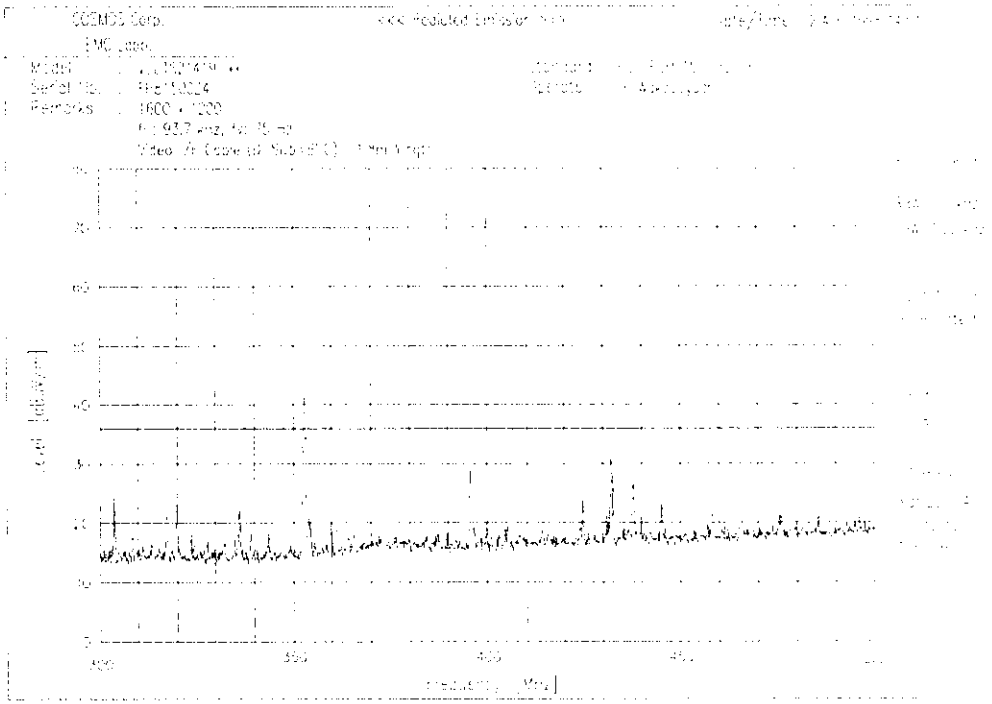


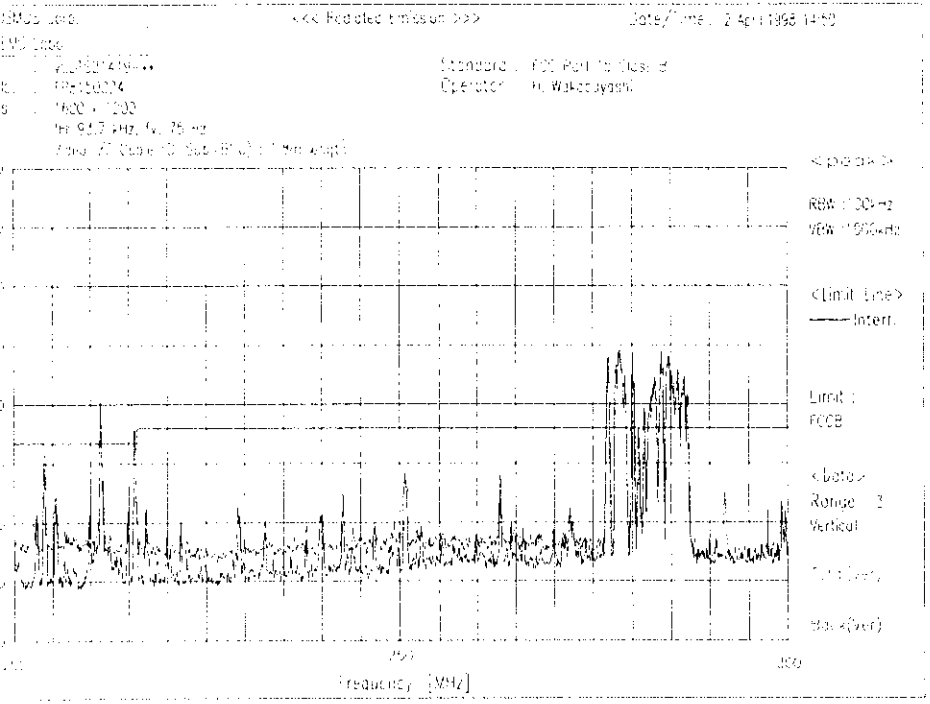
Limit :
FCC Part...

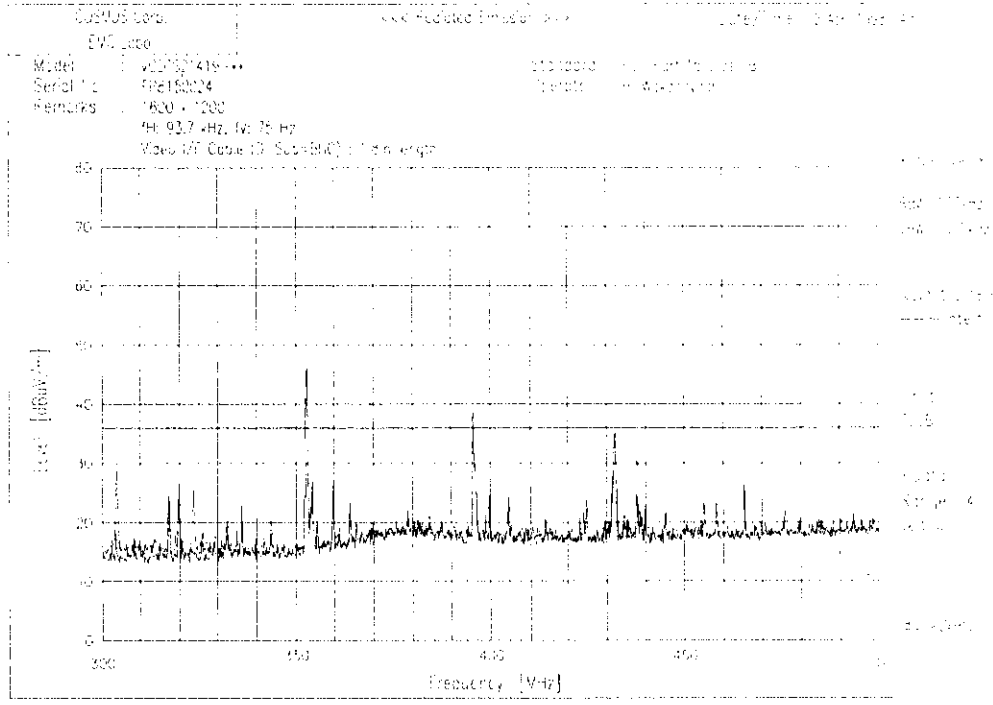
Data :
Line Probe
L1

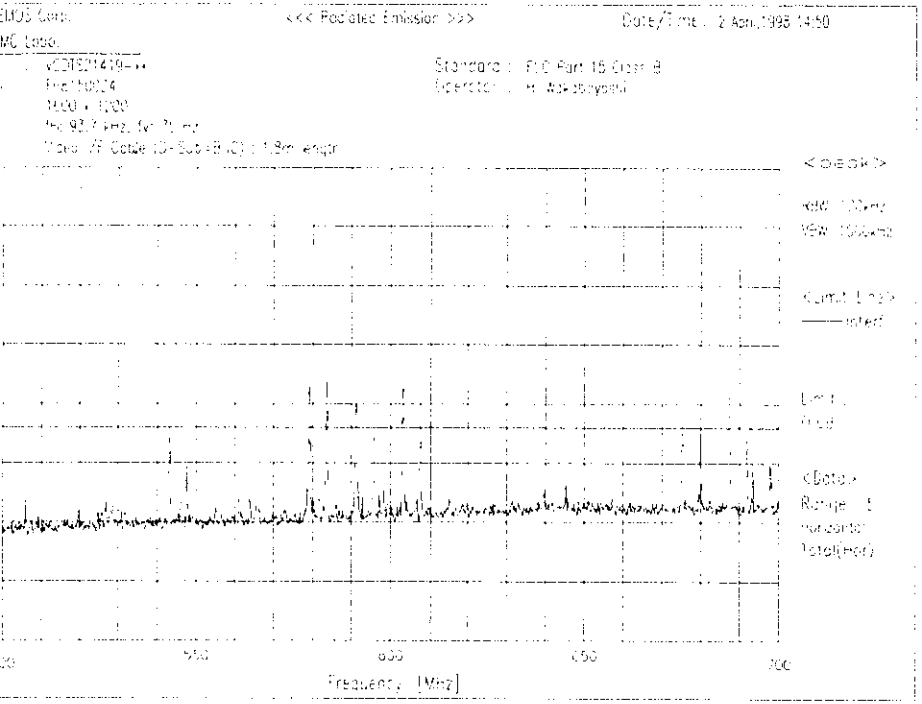

COSMOS Corp.
<<< Radiated Emission >>>
Standard : FCC Part 15 Class B
Operator : H. Matsuyama
Frequency [MHz]

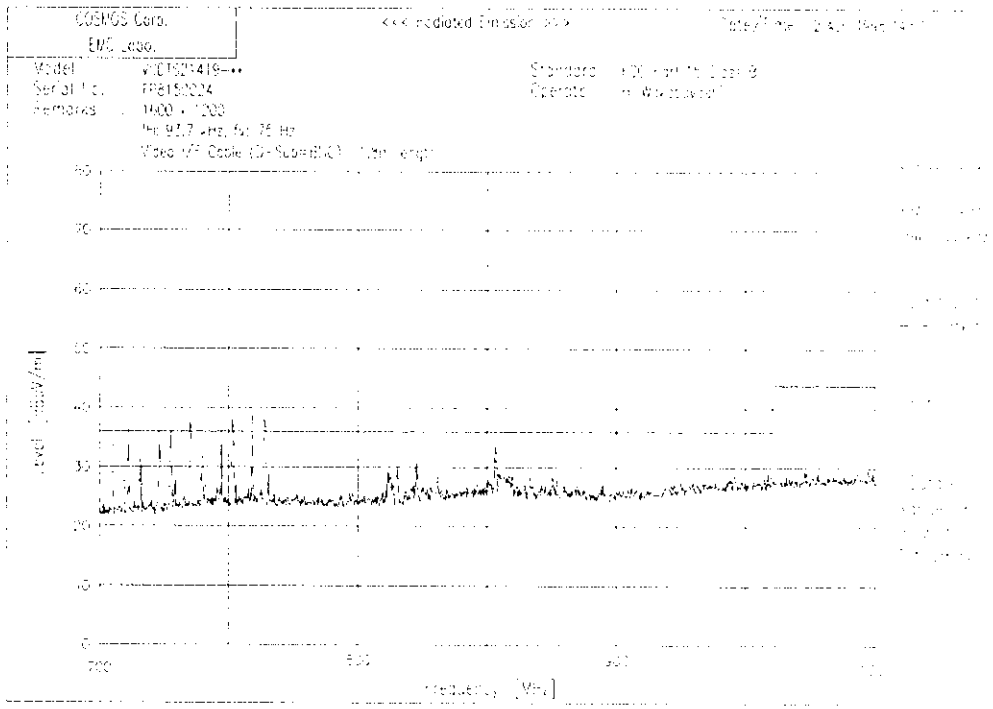

Frequency [MHz]

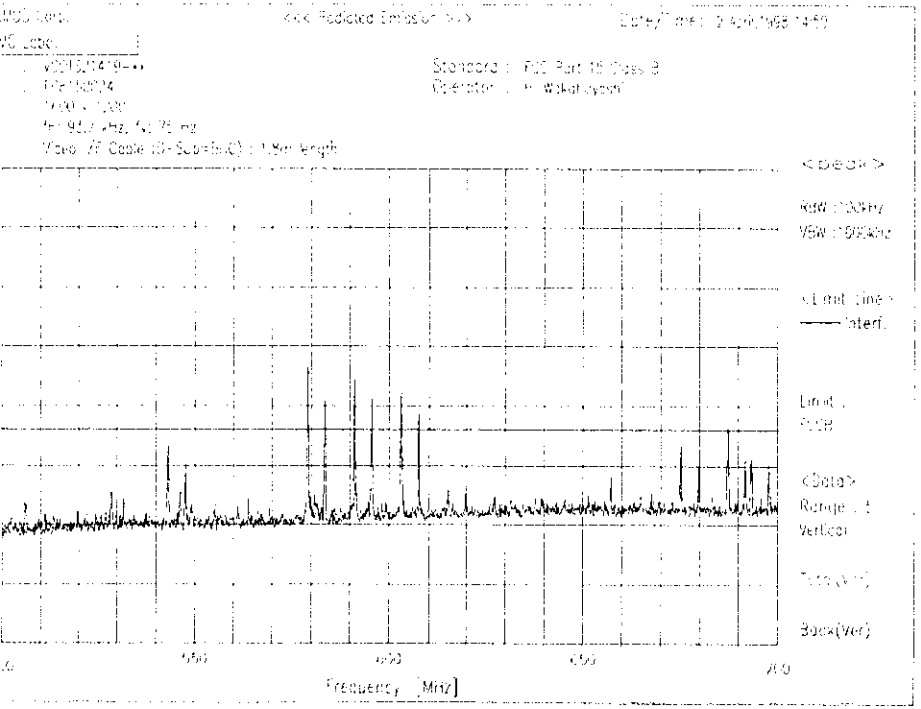

Level [dBuV/m]
Frequency [MHz]

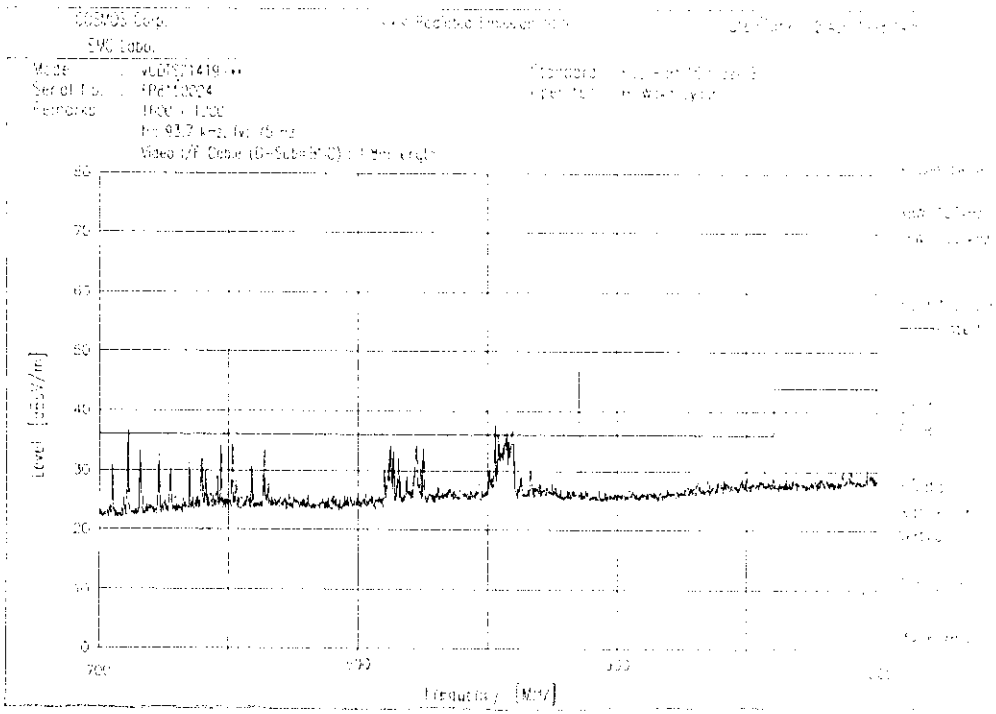

Frequency [MHz]

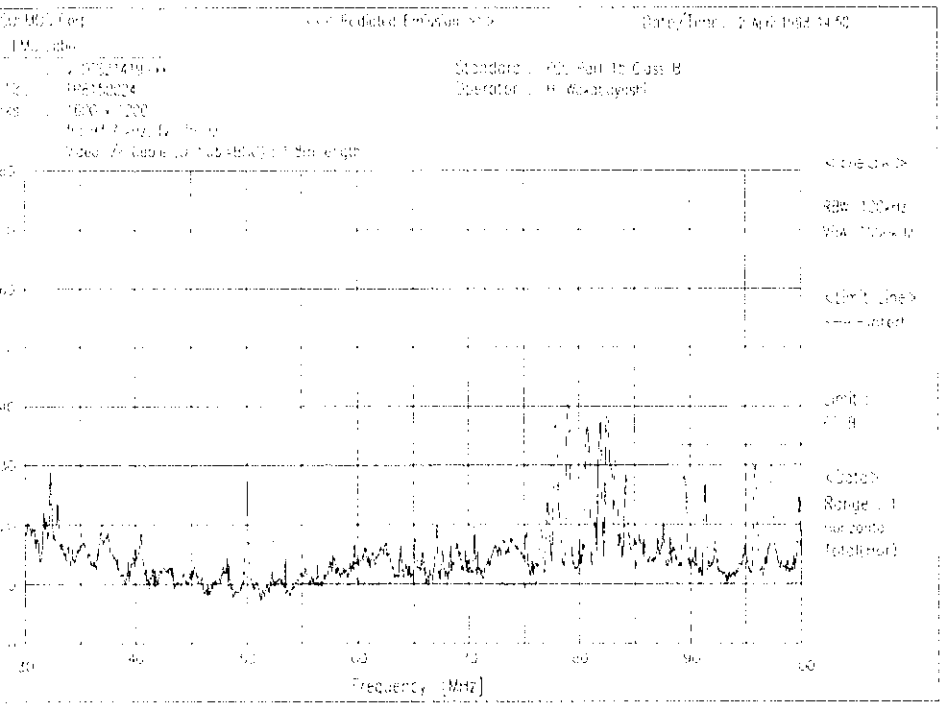

Level [dBuV/m]
Frequency [MHz]


COSMOS Corp.
EMC Labo.
<<< Radiated Emission >>>
Standard : FCC Part 15 Class B
Operator : H. Wakabayashi
<Peak>
<Limit Line>
Interf.
Limit
Data
Range
Vertical
Total(Ver)
Frequency [MHz]


COSMOS Corp.
EMC Labo.
<<< Radiated Emission >>>
Level [dBuV/m]
Frequency [MHz]


COSMOS Corp.
EMC Labo.
<<< Radiated Emission >>>
Standard : FCC Part 15 Class B
Operator : H. Wakabayashi
<Peak>
<Limit Line>
Interf.
Limit
Data
Range
Vertical
Frequency [MHz]


COSMOS Corp.
EMC Labo.
Level [dBuV/m]
Frequency [MHz]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RBW :100kHz
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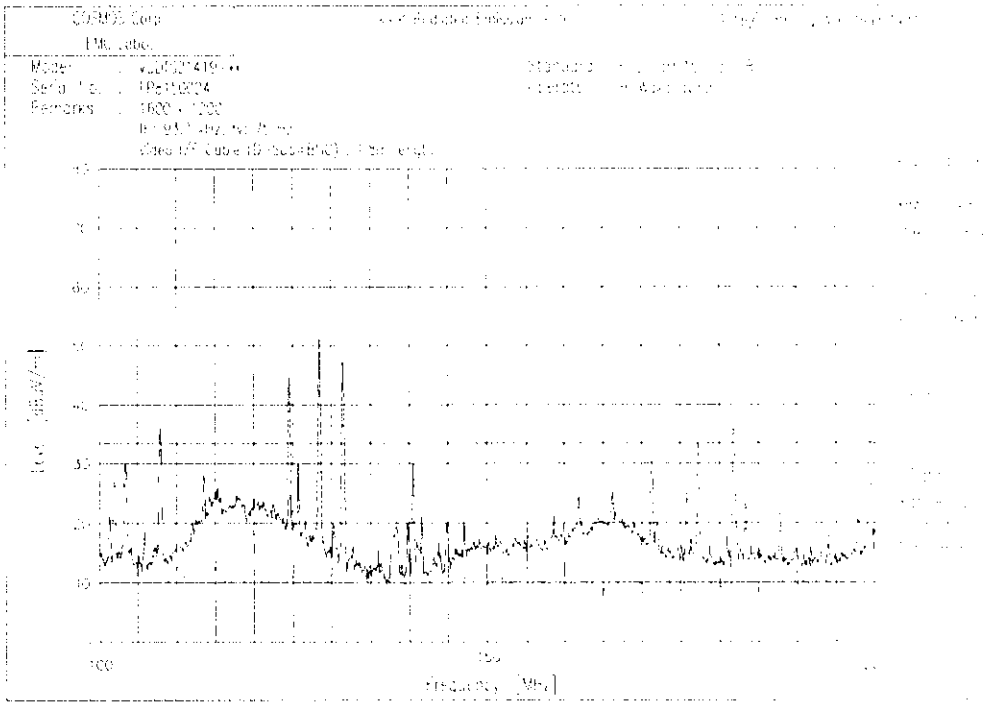
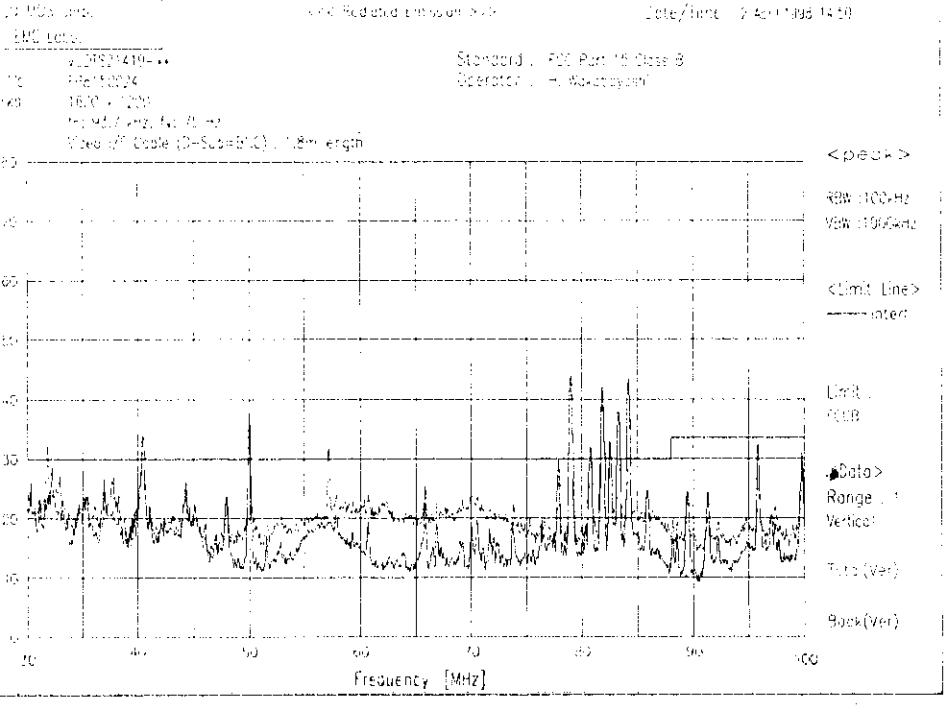
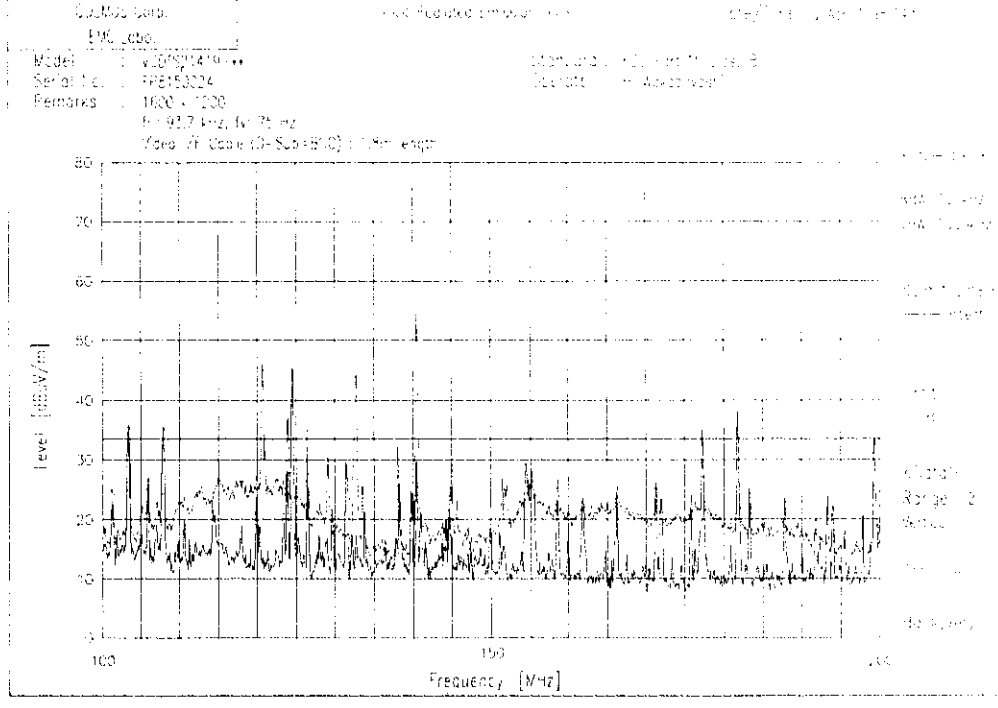
Limit :
QPEAK
<Data>
Range :
Vertical
Frequency [MHz]


Frequency [MHz]


Standard : FCC Part 15 Class B
<peak>
RBW :100kHz
<Limit Line>
Limit :
QPEAK
<Data>
Range :
Vertical
Peak(Ver)
Back(Ver)
Frequency [MHz]


Level [dBuV/m]
Frequency [MHz]

**********COSMOS Corp.**********

<<< Radiated Emission >>>

2 April,1998 15:13

Model : VCDTS21419-**
Serial No. : FP8150024
Standard : FCC Part 15 Class B
Condition File : 10m
Condition : Operated ("H" Pattern)
Remarks : 1600 x 1200
: fH: 93.7 kHz, fV: 75 Hz
: Video I/F Cable (D-Sub=BNC) : 1.8m length
AC Power : 120 V 60 Hz
Temperature : 19 deg.
Humidity : 50 %
Operator : H. Wakabayashi

****

----- Final Result -----

- Horizontal Polarization -

No.	Frequency [MHz]	Reading [dBuV]	c.f. [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
1	115.372	49.4	-15.9	33.5	43.5	10.0

- Vertical Polarization -

No.	Frequency [MHz]	Reading [dBuV]	c.f. [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
2	32.025	44.7	-11.8	32.9	40.0	7.1
3	69.765	55.0	-21.9	33.1	40.0	6.9
4	114.997	50.2	-15.9	34.3	43.5	9.2
5	155.545	46.5	-16.6	29.9	43.5	13.6
6	303.411	54.1	-12.5	41.6	46.0	4.4

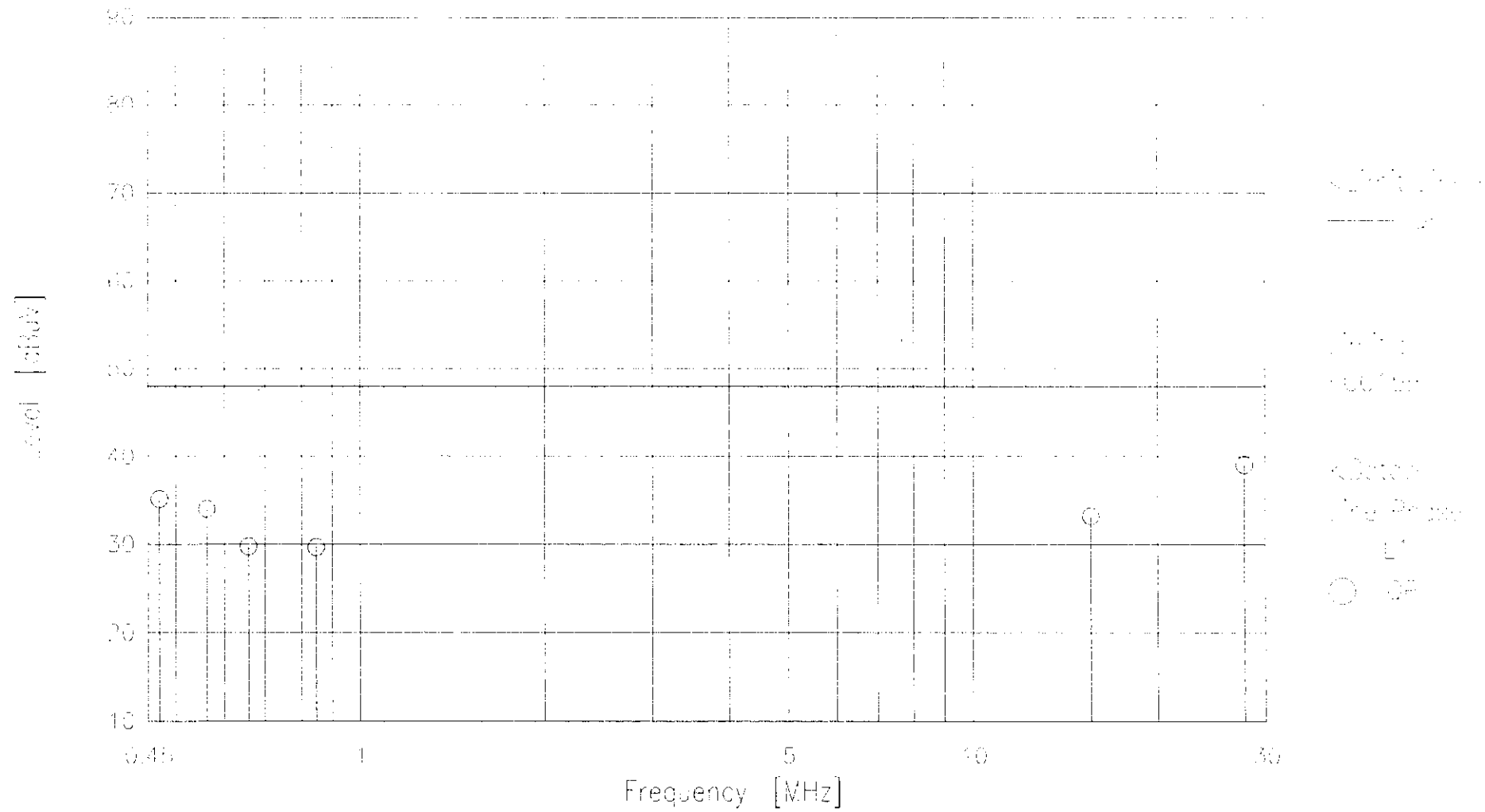
COSMOS Corp.
EMC Lab.

<<< Conducted Emission >>>

Date: 7th March, 1996

Model : VCCTS21419-xx
Serial No. : FP6150024
Temperature : 1800 x 1200
f=1 93.7 KHz, fo: 75 Hz
Mass I/F Cable (D-Sub-BNC) : 1.8m length

Standard : FCC Part 15 Class B
Operator : H.Wakabayashi



COSMOS Corp. <<< Conducted Emission >>> Date/Time: 07 Mon, 07:[illegible]

EMC test.

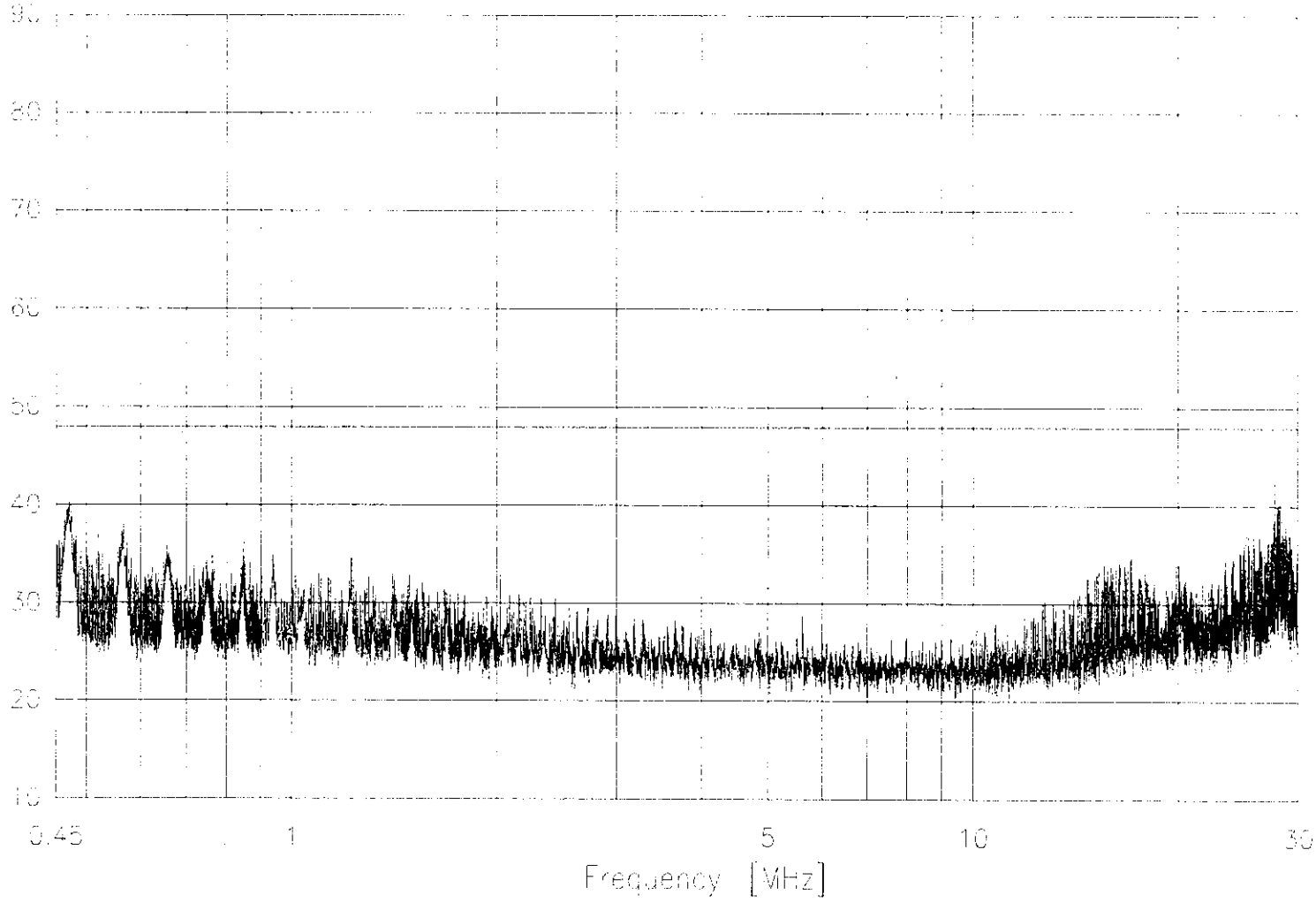
Mode : vC07N2[illegible]19 ++ Standard : FCC Part 15, Class B

Serial No. : FP8150024 Operator : H.Wakabayashi

Remarks : 1600 x 1200

IF: 9[illegible].7 kHz, VF: 75 Hz

Video I/F Cable (D-Sub-BNC) : 1.8m length



********** COSMOS Corp. **********

<<< Conducted Emission >>>

31 March,1998 19:10

Model : VCDTS21419-**
Serial No. : FP8150024
Standard : FCC Part 15 Class B
Condition File : FCC-B
: Operated ("H" Pattern)
Remark : 1600 x 1200
: fH: 93.7 kHz, fV: 75 Hz
: Video I/F Cable (D-Sub=BNC) : 1.8m length
AC Power : 120 V 60 Hz
Temperature : 19 deg.
Humidity : 55 %
Operator : H.Wakabayashi

---------- Results ----------

No.	Frequency [MHz]	Reading [dBuV]	c.f. [dB]	Result [dBuV]	Limit [dBuV]	Margin [dB]
Phase N						
1	0.46970	27.5	10.8	38.3	48.0	9.7
2	0.56160	23.3	10.8	34.1	48.0	13.9
3	0.65607	21.2	10.7	31.9	48.0	16.1
4	0.75150	17.3	10.7	28.0	48.0	20.0
5	0.84558	18.2	10.7	28.9	48.0	19.1
6	27.71814	27.7	12.9	40.6	48.0	7.4

7.2 Conducted Emission

Measurement of conducted emissions between 30 dB μ V and 60 dB μ V over the frequency range 9 kHz to 30 MHz .

Contribution	Probability Distribution	Uncertainty (±dB)	
		9 kHz - 150 MHz	150 - 30 MHz
Receiver specification	rectangular	1.3	1.3
LISN coupling specification	rectangular	1.3	1.3
Cable and input attenuator calibration	normal (k = 2)	0.3	0.5
Mismatch Receiver VRC: Γ_1= 0.03 LISN VRC: Γ_g= 0.8 (9 kHz) 0.2 (30 MHz) Uncertainty limits 20Log (1 ± $\Gamma_1 \Gamma_g$)	U-shaped	0.2	0.05
System repeatability (previous assessment of s(q_k) from 10 repeats, 1 reading on EUT)	Standard dev.	0.2	0.35
Repeatability of EUT*		–	–
Combined standard uncertainty u_c (y)	normal	1.12	1.13
Expanded uncertainty U	normal (k = 2)	2.24	2.26

Calculation for 9 kHz to 150 kHz range:

$$u_c(y) = \pm\sqrt{\frac{1.3^2 + 1.3^2}{3} + \left(\frac{0.3}{2}\right)^2 + \frac{0.2^2}{2} + 0.2^2} = \pm 1.12 \text{ dB}$$

k=2:

$$U = 2 \times u_c(y) = 2 \times \pm 1.12 = \pm 2.24 \text{ dB}$$

7.1 Radiated Emission

Measurement of vertically polarised field strength between 30 dB μ V/m and 60 dB μ V/m over the frequency range 30 MHz to 1 GHz on an open area test site at 10m and 30m

Contribution	Probability Distribution	Uncertainty ± [dB]	
		Biconical Logperiodic Antenna	
		10m	30m
Ambient Signals		–	–
Antenna factor calibration	normal (k = 2)	1.0	1.0
Cable loss calibration	normal (k = 2)	0.5	0.8
Receiver specification	rectangular	1.5	1.5
Antenna directivity	rectangular	0.3	0
Antenna factor variation with height	rectangular	2.2	2.2
Antenna phase centre variation	rectangular	0.2	0.1
Antenna factor frequency interpolation	rectangular	0.2	0.2
Measurement distance variation	rectangular	0.4	0.2
Site imperfections	rectangular	1.5	1.5
Mismatch Receiver VRC: Γ_1= 0.2 Antenna VRC: Γ_g=0.67 (Bi) 0.3 (Lp) Uncertainty limits 20Log (1± $\Gamma_1 \Gamma_g$)	U-shaped	1.1	1.1
System repeatability (previous assessment of s(q_k) from 5 repeats. 1 reading on EUT)	Std Deviation	0.5	0.5
Repeatability of EUT*		–	–
Combined standard uncertainty u_c (y)	normal	2.09	2.098
Expanded uncertainty U	normal (k = 2)	4.18	4.197

6. List of Test and Measurement Instruments

Conducted Emission

Manufacturer	Instruments	Model / Type	Serial No.	Calibration Date Next Calibration
ROHDE & SCHWARZ	Spectrum Analyzer	FSB / DISPLAY	838497/005 / 838301/009	May, 1997 May, 1998
ROHDE & SCHWARZ	EMI Test Receiver	ESHS10	842121/012	April, 1997 April, 1998
ROHDE & SCHWARZ	Artificial-Mains Network	ESH2-Z5	842210/010	May, 1997 May, 1998
CHASE ELECTRONICS LIMITED	Artificial-Mains Network	MN2050B	1140	April, 1997 April, 1998

Radiated Emission

Manufacturer	Instruments	Model / Type	Serial No.	Calibration Date Next Calibration
ROHDE & SCHWARZ	Spectrum Analyzer	FSB / DISPLAY	838497/005 / 838301/009	May, 1997 May, 1998
ROHDE & SCHWARZ	EMI Test Receiver	ESVS10	842122/014	April, 1997 April, 1998
CHASE ELECTRONICS LIMITED	Pre-Amplifier	CPA9231	3045	February, 1998 February, 1999
CHASE ELECTRONICS LIMITED	Biconical Logperiodic Antenna	CBL6111B	2051	November, 1997 November, 1998

5. Radiated Emission Data

The following data lists the significant emission frequencies, measured levels, correction factor (includes cable and antenna corrections), the corrected reading, plus the limit. Explanation of the Correction Factor is given in paragraph.

Frequency (MHz)	Polarity (H/V)	Receiver * Reading (dB μ V)	Correction Factor (dB/m)	Corrected Reading (dB μ V/m)	3 Meter Limit (dB μ V/m)
115.372	Horizontal	49.4	-15.9	33.5	43.5
32.025	Vertical	44.7	-11.8	32.9	40.0
69.765	Vertical	55.0	-21.9	33.1	40.0
114.997	Vertical	50.2	-15.9	34.3	43.5
155.545	Vertical	46.5	-16.6	29.9	43.5
303.411	Vertical	54.1	-12.5	41.6	46.0

*All readings are quasi-peak unless stated otherwise, with an IF bandwidth of 120 kHz, along with an 1 S sweep time. A video filter was not used.

Environment:

Temperature 19 ℃
Humidity 50 %

Tested Personnel:

Tester Signature Hiroshi Wakabayashi

Typed/Printed Name Hiroshi Wakabayashi

2. System Test Configuration (Continued)

2.5 Configuration of Tested System (Continued)

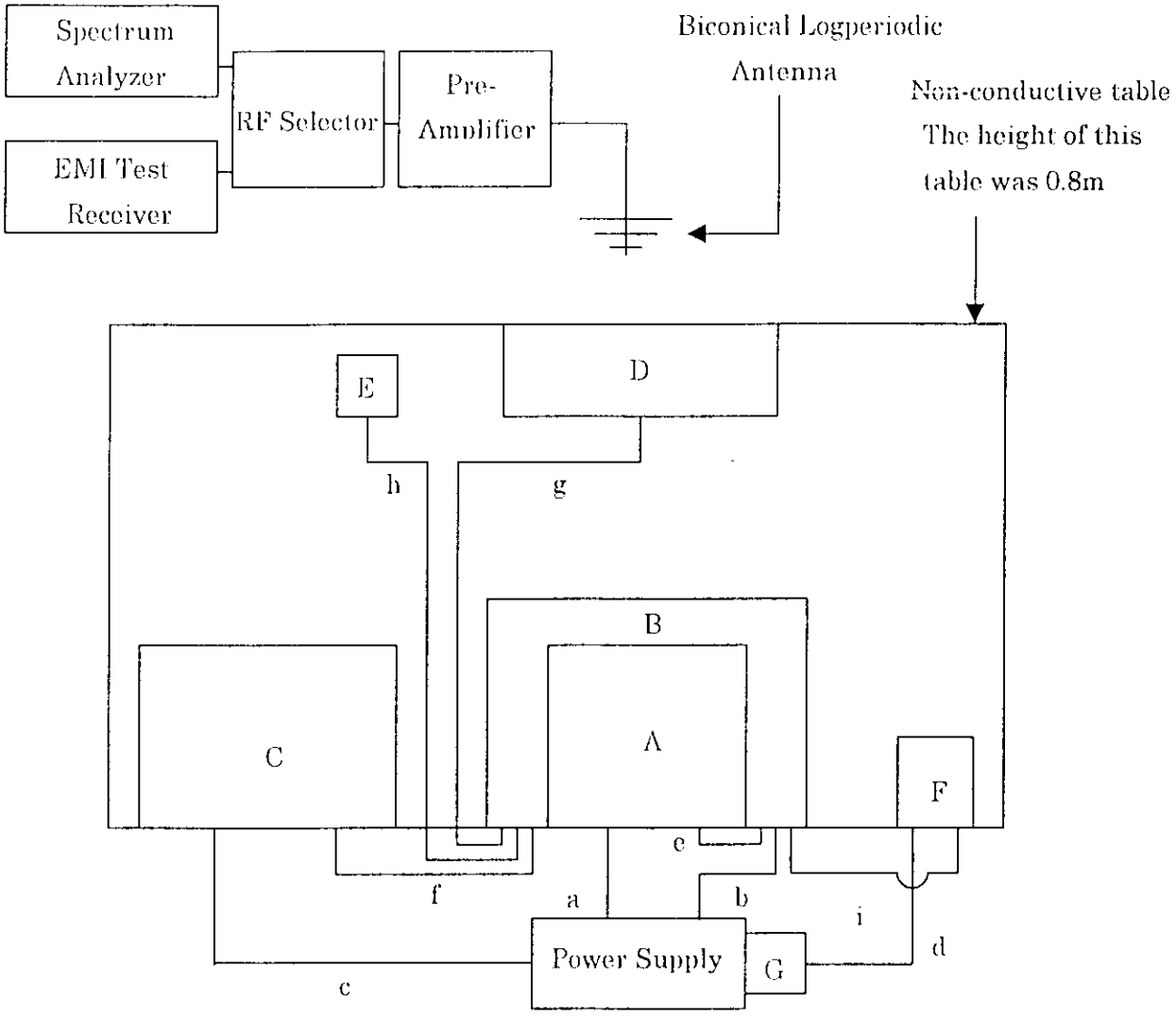
Radiated Emission

1) EUT is put on the Personal Computer.
2) Personal Computer and Printer located at 0.1m intervals.
3) Personal Computer and Modem located at 0.1m intervals.
4) Keyboard and Mouse located at 0.1m intervals.
5) EUT is connected to Power Supply by the AC Power Cord.
   Extended Cord was folded at the center of Cord by 0.35m length.
   and the Cord was hung in the middle between ground and table.
6) Personal Computer is connected to Power Supply by the AC Power Cord.
   Extended Cord was folded at the center of Cord by 0.4m length.
   and the Cord was hung in the middle between ground and table.
7) Printer is connected to Power Supply by the AC Power Cord.
   Extended Cord was folded at the center of Cord by 0.35m length.
   and the Cord was hung in the middle between ground and table.
8) AC Adaptor is connected to Artificial-Mains Network (Model MN2050B).
9) Modem is connected to AC Adaptor by the AC Power Cord.
   Extended Cord was folded at the center of Cord by 0.4m length.
   and the Cord was hung in the middle between ground and table.
10) EUT is connected to Personal Computer by the Video I/F Cable.
    Extended Cable was folded at the center of Cable by 0.4m length.
    and the Cable was hung in the middle between ground and table.
11) Personal Computer is connected to Printer by the Printer Cable.
    Extended Cable was folded at the center of Cable by 0.4m length.
    and the Cable was hung in the middle between ground and table.
12) Personal Computer is connected to Keyboard by the Keyboard I/F Cable.
13) Personal Computer is connected to Mouse by the Mouse I/F Cable.
14) Personal Computer is connected to Modem by the Modem I/F Cable.
    Extended Cable was folded at the center of Cable by 0.4m length.
    and the Cable was hung in the middle between ground and table.

2. System Test Configuration (Continued)

2.5 Configuration of Tested System (Continued)

Radiated Emission



2. System Test Configuration (Continued)

2.5 Configuration of Tested System

	Instrument		Cord / Cable
A)	EUT	a)	AC Power Cord 1.8m Unshielded
B)	Personal Computer	b)	AC Power Cord 2.3m Unshielded
C)	Printer	c)	AC Power Cord 1.8m Unshielded
D)	Keyboard	d)	AC Power Cord 1.9m Unshielded
E)	Mouse	e)	Video I/F Cable 1.8m Shielded
F)	Modem	f)	Printer Cable 3.0m Shielded
G)	AC Adaptor	g)	Keyboard I/F Cable 2.3m Unshielded
		h)	Mouse I/F Cable 1.85m Shielded
		i)	Modem I/F Cable 1.85m Shielded

1. General Information (Continued)

1.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4:1992. Radiated testing was performed at an antenna to EUT distance of 10 meters. Final Result was converted in 3m, using 20 log 10m / 3m.

1.5 Test Facility

The open area test site, Cosmos EMC Lab., and conducted measurement facility used to the radiated data is located at 543 Shimesasu, Watarai-cho, Watarai-gun, Mie-ken, 516-2119, Japan. This site has been fully described in a report dated May 23, 1996 submitted to FCC, and accepted in a letter dated July 10, 1996 (31040/SIT 1300F2).

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