NAMAS
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HITACHI

TEST REPORT NO: H8326

DATE: 18/08/98

COPY NO: 1

ISSUE 1

REPORT ON THE
RFI TESTING OF A
HITACHI HOME ELECTRONICS
21" MCM212V MONITOR
WITH RESPECT TO
THE FCC RULES CFR 47: OCT 1995
PART 15 LIMIT 5

TEST DATE: 18 August, 1998.

TESTED BY: ..... K. RICHARDS

APPROVED BY: ..... G. MEEK

Distribution:

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MANUFACTURING DIVISION

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SUMMARY

PURPOSE OF TEST:	Radio Frequency Interference Emissions CERTIFICATION
TEST SPECIFICATION:	FCC Rules CFR 47 (OCT 1995) Part 15 Limit B
EQUIPMENT UNDER TEST:	21" MCM212V MONITOR
EQUIPMENT SERIAL NO:	H8326
TEST RESULT:	**COMPLIANT**
MANUFACTURER/AGENT:	HITACHI HOME ELECTRONICS (EUROPE) HIRWAUN INDUSTRIAL ESTATE ABERDARE MID GLAMORGAN CF44 9UY
TESTED BY:	HHEE/MD QA EMC Lab
DATE OF TEST:	18 August, 1998.

CONTENTS

1. INTRODUCTION

This report presents the results of Electromagnetic Compatibility (EMC) tests carried out in accordance with the FCC Rules CFR 47: OCT 1995 Part 15, Limit B, specification on equipment type HITACHI HOME ELECTRONICS 21" MCM212V MONITOR DISPLAY UNIT.

The testing was carried out for HITACHI HOME ELECTRONICS BY HHEE/MD EMC Lab test house, at their EMC test facility located at Hirwaun Industrial Estate, Aberdare, Mid Glamorgan, South Wales.

The test site is calibrated as recommended in Document ANSI C63.4 1992.

This report also details the configuration of the equipment under test, the methods used, and any relevant modifications where appropriate.

The equipment and peripherals were operated as specified in document MP4 (1987) and ANSI C63.4:1992.

2 SYSTEM UNDER TEST

2.1 Equipment Under Test (EUT)

HITACHI HOME ELECTRONICS (EUROPE) / MD

21" MCM212V MONITOR

Serial No: H8326

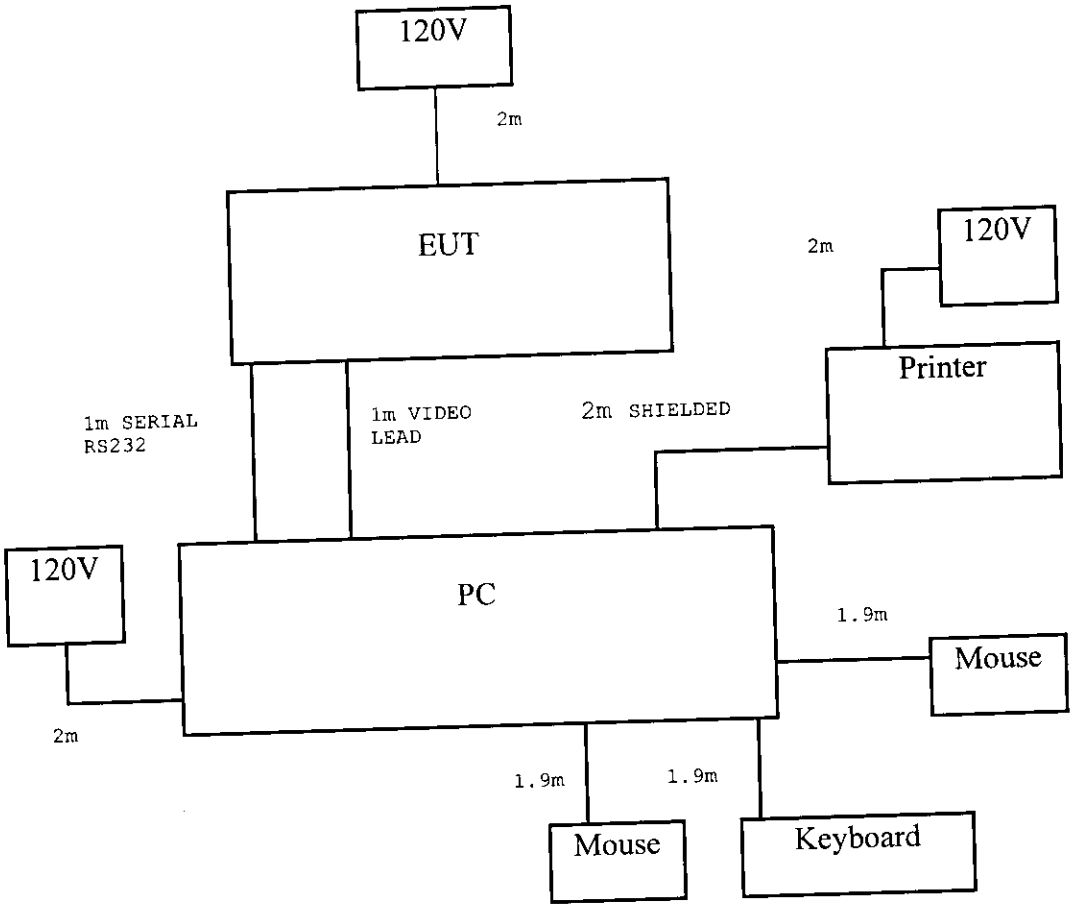
2.2 System Equipment

1.	Computer Scenic Pro M5 Siemens NIXDORF	Serial no: 1087
2.	Keyboard KBPC SUK	Serial no: S26381-K-252 V165 FCC ID OG66 1EEGHD
3.	Microsoft mouse 21A	Serial no: 00031685 FCC ID. C3KKMP3
4.	Printer Hewlett Packard ThinkJet Model No 2225CU	Serial no: 2803S01949 FCC ID: DS16XU2225

2.3 EUT During Testing

The PC was running test software via windows that continually fill the screen with scrolling 'H'. The PC had all the ports loaded with peripherals.

2.4 Block Diagram of EUT Configuration



Note 1: Both serial lead and video lead were standard Hitachi Home Electronic cable with ferrite on either end.

Note 2: All are unshielded unless otherwise labelled.

3. TEST CONDITIONS

3.1 Power Line Conducted Emissions

Measurement Freq Range	:-	150kHz - 30MHz
Line Voltage	:-	120V AC
Line Frequency	:-	60 Hz
LISN Impedance	:-	50Ω/50μH
Receiver		
bandwidth	:-	9kHz
detector	:-	Quasi-Peak (CISPR time constants)
Configuration	:-	Conforming to FCC Document MP-4 1987 and ANSI C63.4:1992
EUT Height	:-	0.8 m table
Remarks	:-	

Measurement Uncertainty :- See Appendix A.

Test equipment used for the Conduction measurement was:

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	ACTUAL EQUIPMENT USED
LISN	Rohde & Schwarz	ESH3-Z5	863794/019	YES
RECEIVER	Rohde & Schwarz	ESMI	839013/003	YES

3.2 Radiated E-Field Emissions

Measurement Freq Range	:-	30Mhz - 2GHz
Measurement Distance	:-	3 meters
Antenna Height	:-	1 - 4 meters
Antenna Polarisation	:-	Vertical and Horizontal
Receiver		
bandwidth	:-	120kHz
detector	:-	Quasi-Peak (CISPR time constants)
Ambient Conditions	:-	N/A
EUT Height	:-	0.8m table
Remarks	:-	All measurements were carried out in Semi Anechoic Chamber and calibrated in accordance with ANSI C63-4 1992 document.

3m

All significant emissions were maximised by:
(a) rotating the EUT
(b) elevating antenna
(c) polarising antenna Horizontal and Vertical
(d) manipulation and placement of system and power cables.

Measurement Uncertainty :- See Appendix A.

Test equipment used for the Radiated Emission measurement was:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	ACTUAL EQUIPMENT USED
SEMI ANECHOIC ROOM	HHEE/MD EMC LAB	TDK	N/A	YES
BILOG ANT	CHASE	CBL 6112	2100	YES
RECEIVER	Rohde & Schwarz	ESMI	839013/003	YES

4. RESULTS OF TESTS

All measurements were taken with the EUT operating in a mode that activates all components of the equipment (see section 2.3). All external interface cables and loaded with appropriate termination's.

Significant emissions are shown on Graph 1 (Power Line Conducted Emissions) and Graph 2 (Radiated E-Field Emissions). The results recorded on Graph 2 are maximum values recorded with respect to EUT azimuth, receiver antenna polarisation and height.

The table below summarises worst case results.

MEASUREMENT	FREQUENCY	EMISSION LEVEL	LIMIT VALUE
Power Line Conducted Emissions (Graph 1)	NO SIGNIFICANT EMISSIONS DETECTED WITHIN 6dB OF THE LIMIT		
Radiated E-Field Emissions (Graph 2)	NO SIGNIFICANT EMISSIONS DETECTED WITHIN 5dB OF THE LIMIT		

4.1 Sample Calculation

The radiated emission levels used in this report are calculated thus:

FREQUENCY (MHz)	MEASURED VALUE (dBμv)	ANTENNA VALUE (dB)	EMISSION LEVEL (dBμV/m)
NO SIGNIFICANT EMISSIONS DETECTED WITHIN 6dB OF THE LIMIT See Appendix C			

5. LIST OF EMC MODIFICATIONS

The following EMC modification was incorporated in the equipment during testing.

There were no modifications made to the EUT during testing.

6. CONCLUSIONS

The HITACHI HOME ELECTRONICS, 21" MCM212V MONITOR meets the requirements of FCC Rules CFR 47 (OCT 1995) Part 15, Limit B in the configuration tested defined in Section 2 of this Report and incorporating any modifications detailed in Section 5 of this Report.

GRAPH 1: Power line Conducted Emissions

SEE APPENDIX C

GRAPH 2: Radiated E-Field Emissions

SEE APPENDIX C

APPENDIX A

EMC TEST MEASUREMENT UNCERTAINTY
SCHEDULE A

LABORATORY TESTS

MEASUREMENT		EXPANDED UNCERTAINTY
E-FIELD STRENGTH 3m	<300MHz	±4.5dB
	>300MHz	±4.5dB
CONDUCTED EMISSIONS	PROBE	
AC Power Line	LISN	±2.6dB
RFS	3V/m	±0.81 V
ESD	<10kV	±220V
	>10kV	±320V
FAST BURST TRANSIENTS	<2kV	±100V
	>2kV	
DIPS AND VARIATIONS		±3.0%

FULL MEASUREMENT UNCERTAINTY BUDGETS AND CALCULATIONS APPEAR IN LAB PROCEDURES 06 THROUGH 16 OF EMC CALIBRATION/TEST METHODS AND PROCEDURES MANUAL - ISSUE 5 - DATED 28-04-97

APPENDIX B

PHOTOGRAPHS OF TEST SETUP

APPENDIX C

CONDUCTED & RADIATED EMISSIONS TEST DATA

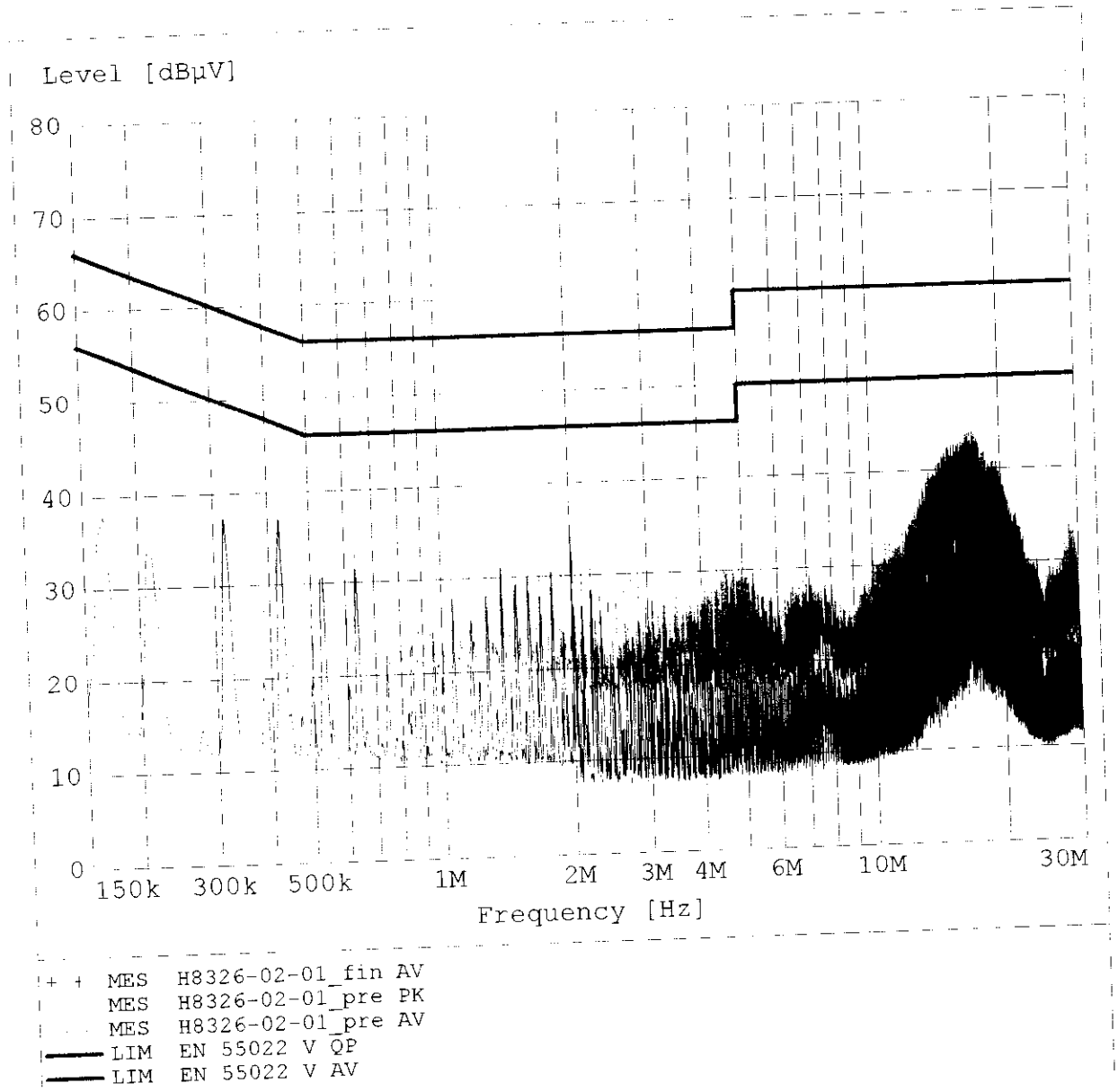
Measurement of Mains Terminal Disturbance Voltage in the frequency range 150KHz to 30MHz - EN55022

MCM212V

EUT / Model No:	21"MDU
Manufacturer:	Hitachi Home Electronics (Europe) Ltd
Support Equipment:	ESMI,ESH3 LISN,Siemens Scenic Pro M5,HP Thinkjet
Resolution/Scan Rate:	1600x1200 106KHz,85Hz
Test Site/Operator:	Hitachi 3M Anechoic Chamber K.Richards
Adjustment/Mains:	Maximum brightness/contrast 120VAC,60Hz
Pattern/Conditions:	Scrolling H T=16C,H=45%
Comment:	Millenium PowerDoc card fitted.

SCAN TABLE: "EN 55022 VolMains"

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	5.0 kHz	MaxPeak Average	20.0 ms	10 kHz	ESH3-Z5



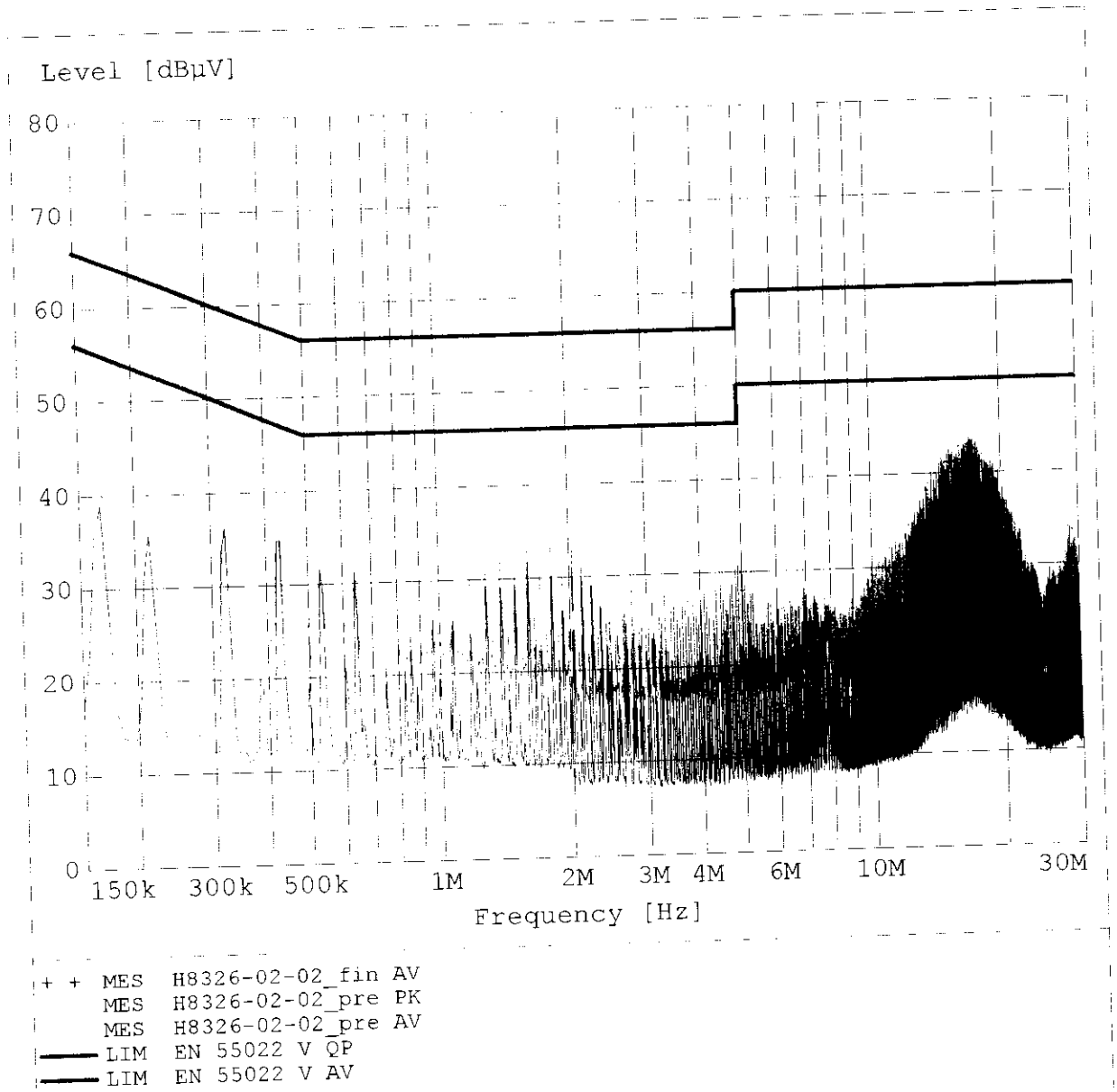
Measurement of Mains Terminal Disturbance Voltage in the frequency range 150KHz to 30MHz - EN55022

MCM212V

EUT / Model No:	21"MDU	
Manufacturer:	Hitachi Home Electronics (Europe) Ltd	
Support Equipment:	ESMI,ESH3 LISN,Siemens Scenic Pro M5,HP Thinkjet	
Resolution/Scan Rate:	1280x1024	107KHz,100Hz
Test Site/Operator:	Hitachi 3M Anechoic Chamber	K.Richards
Adjustment/Mains:	Maximum brightness/contrast	120VAC,60Hz
Pattern/Conditions:	Scrolling H	T=16C,H=45%
Comment:	Millenium PowerDoc card fitted.	

SCAN TABLE: "EN 55022 VolMains"

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	5.0 kHz	MaxPeak Average	20.0 ms	10 kHz	ESH3-Z5



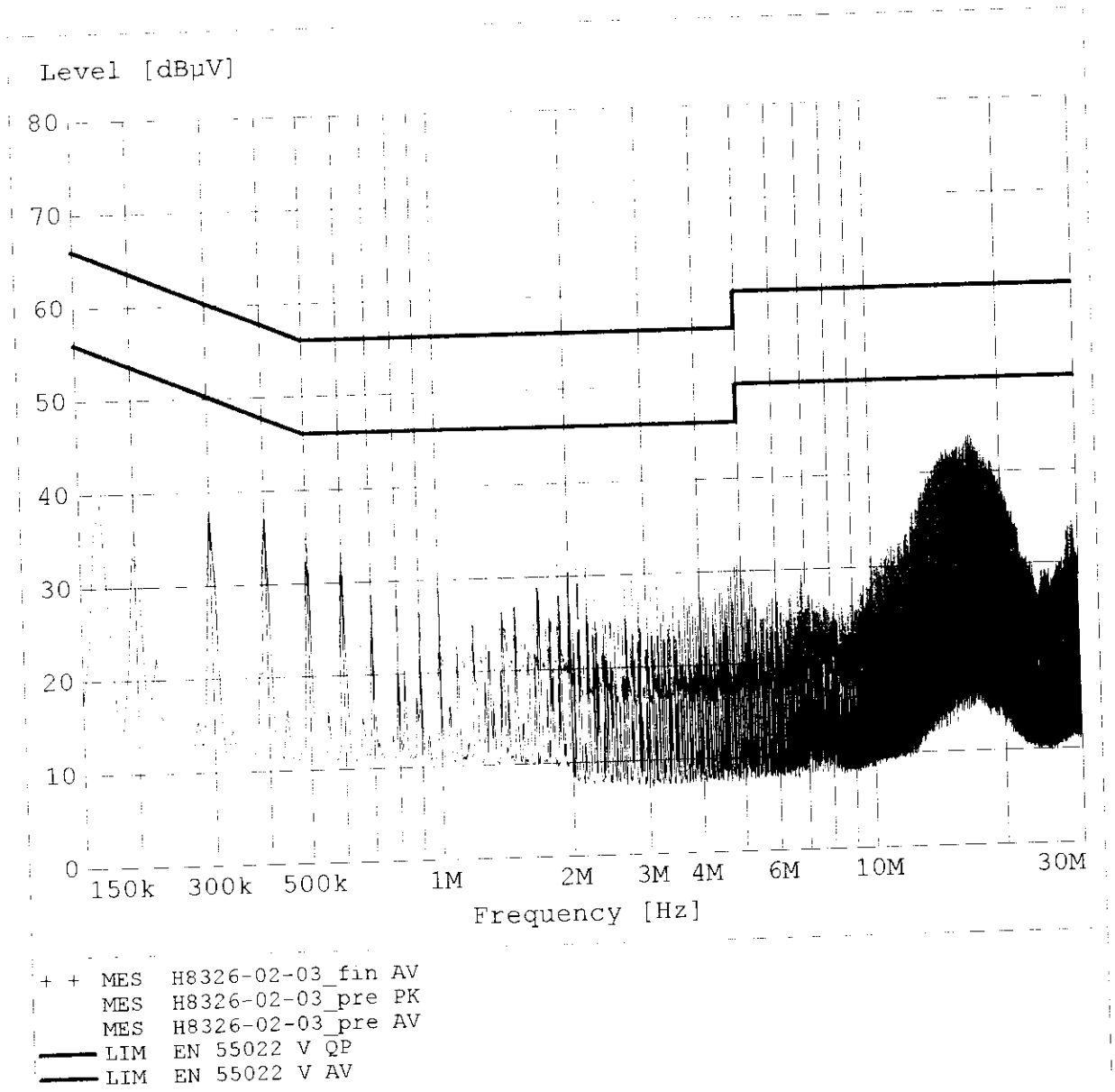
Measurement of Mains Terminal Disturbance Voltage in the frequency range 150KHz to 30MHz - EN55022

MCM212V

EUT / Model No:	21"MDU	
Manufacturer:	Hitachi Home Electronics (Europe) Ltd	
Support Equipment:	ESMI,ESH3 LISN,Siemens Scenic Pro M5,HP Thinkjet	
Resolution/Scan Rate:	1152x864	100KHz,110Hz
Test Site/Operator:	Hitachi 3M Anechoic Chamber	K.Richards
Adjustment/Mains:	Maximum brightness/contrast	120VAC,60Hz
Pattern/Conditions:	Scrolling H	T=16C,H=45%
Comment:	Millenium PowerDoc card fitted.	

SCAN TABLE: "EN 55022 VolMains"

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	5.0 kHz	MaxPeak Average	20.0 ms	10 kHz	ESH3-Z5



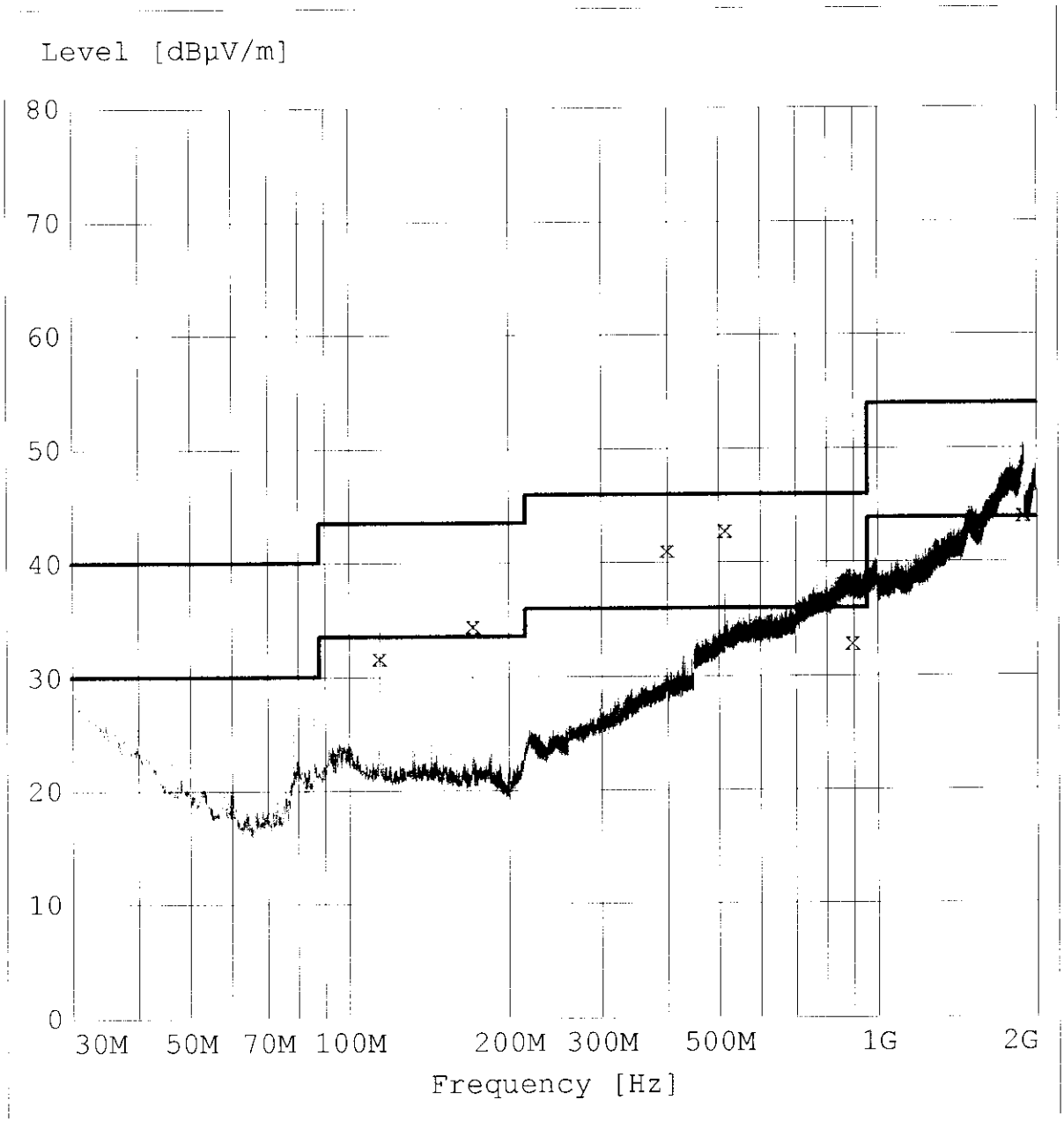
Measurement of Radiated Emissions over frequency range 30MHz to 2GHz - FCC class B.

EUT/Model No::	21"MDU	MCM212V
Manufacturer::	Hitachi Home Electronics (Europe) Ltd.	
Support Equipment::	ESMI,CBL6112,Siemens Scenic Pro M5,HP Thinkjet.	
Resolution/Scan Rate:	1600x1200	106KHz,85Hz
Test Site/Operator::	Hitachi 3M Anechoic Chamber	K.Richards
Adjustment/Mains::	Maximum brightness/contrast	120VAC,60Hz
Pattern/Conditions::	Scrolling`H`	T=18C,H=40%
Comment:	Millenium PowerDoc card fitted.	

SCAN TABLE: "FCC B Field"

Short Description: FCC Class B Radiated E Field

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	80.0 kHz	MaxPeak	10.0 ms	120 kHz	CBL 6112
1.0 GHz	2.0 GHz	80.0 kHz	MaxPeak	10.0 ms	120 kHz	CBL 6112
			MaxPeak			



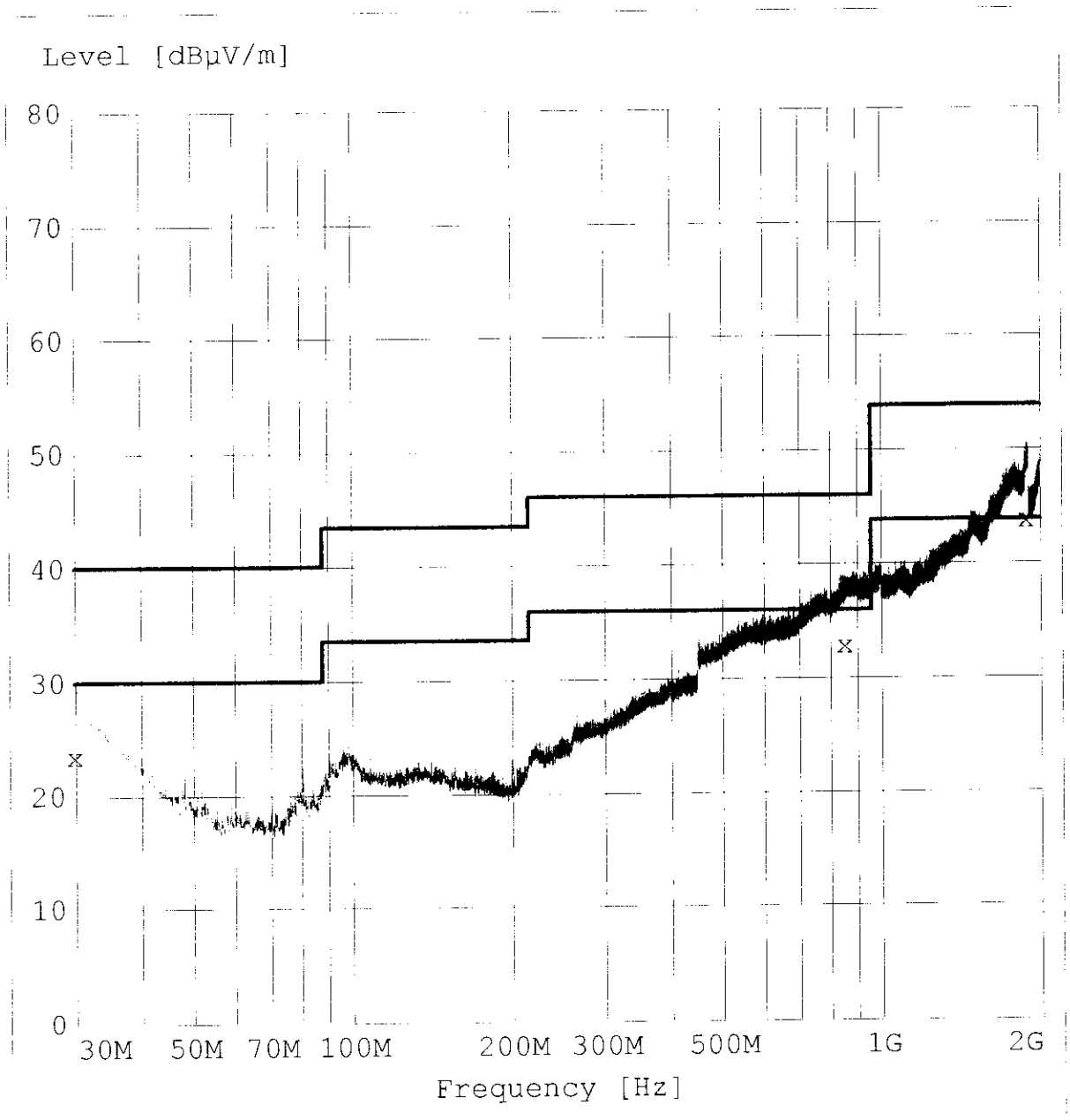
Measurement of Radiated Emissions over frequency range 30MHz to 2GHz - FCC class B.

EUT/Model No::	21"MDU	MCM212V
Manufacturer::	Hitachi Home Electronics (Europe) Ltd.	
Support Equipment::	ESMI,CBL6112,Siemens Scenic Pro M5,HP Thinkjet.	
Resolution/Scan Rate:	1280x1024	107KHz,100Hz
Test Site/Operator::	Hitachi 3M Anechoic Chamber	K.Richards
Adjustment/Mains::	Maximum brightness/contrast	120VAC,60Hz
Pattern/Conditions::	Scrolling`H`	T=18C,H=40%
Comment:	Millenium PowerDoc card fitted.	

SCAN TABLE: "FCC B Field"

Short Description: FCC Class B Radiated E Field

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	80.0 kHz	MaxPeak	10.0 ms	120 kHz	CBL 6112
1.0 GHz	2.0 GHz	80.0 kHz	MaxPeak	10.0 ms	120 kHz	CBL 6112
			MaxPeak			



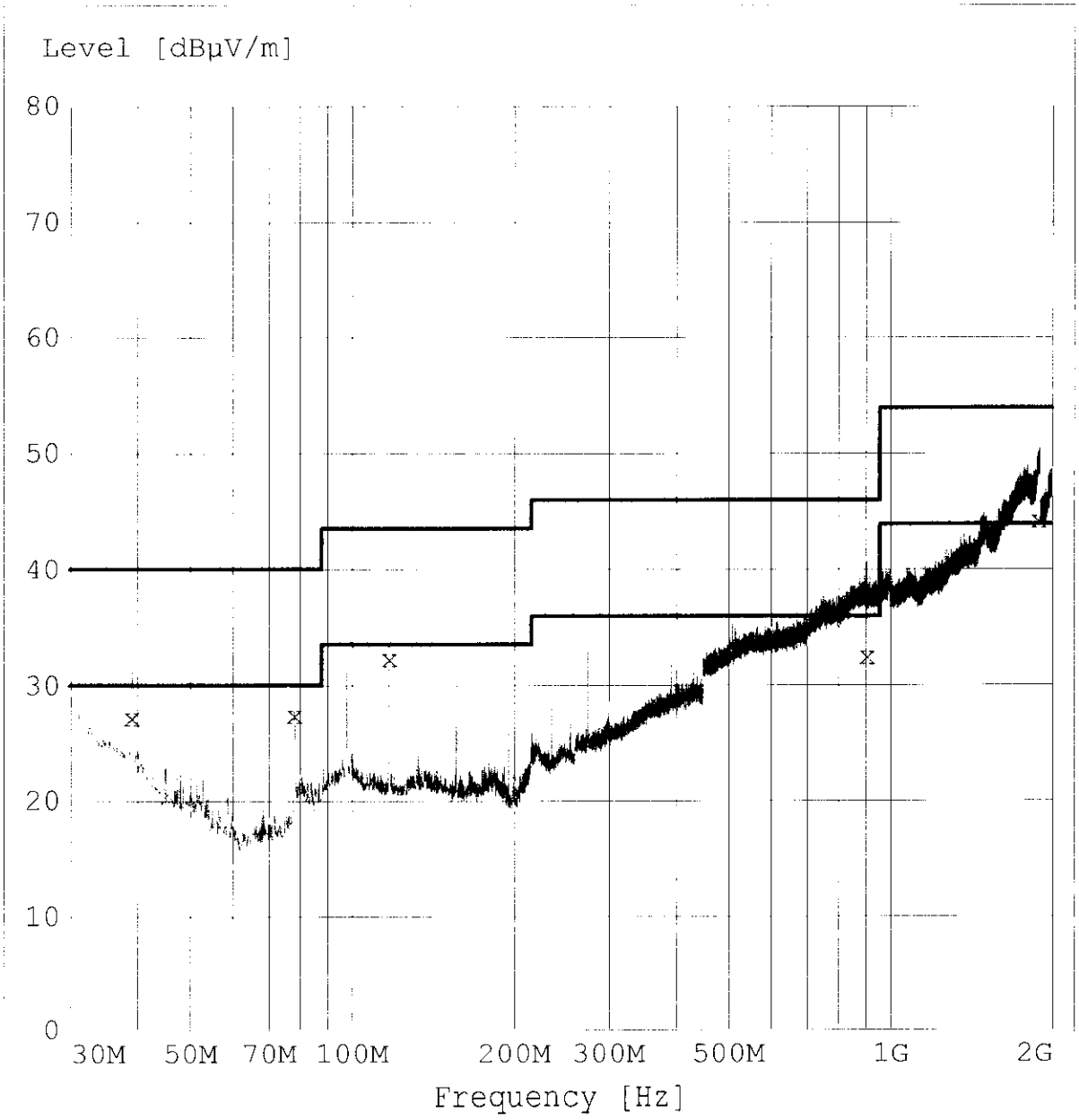
Measurement of Radiated Emissions over frequency range 30MHz to 2GHz - FCC class B.

EUT/Model No::	21"MDU	MCM212V
Manufacturer::	Hitachi Home Electronics (Europe) Ltd.	
Support Equipment::	ESMI,CBL6112,Siemens Scenic Pro M5,HP Thinkjet.	
Resolution/Scan Rate:	1152x864	100KHz,110Hz
Test Site/Operator::	Hitachi 3M Anechoic Chamber	K.Richards
Adjustment/Mains::	Maximum brightness/contrast	120VAC,60Hz
Pattern/Conditions::	Scrolling`H`	T=18C,H=40%
Comment:	Millenium PowerDoc card fitted.	

SCAN TABLE: "FCC B Field"

Short Description: FCC Class B Radiated E Field

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	80.0 kHz	MaxPeak	10.0 ms	120 kHz	CBL 6112
1.0 GHz	2.0 GHz	80.0 kHz	MaxPeak	10.0 ms	120 kHz	CBL 6112
			MaxPeak			



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Ref. 00080

12 August 1998

Federal Communications Commission
Applications Processing Branch
7435 Oakland Mills Road
Columbia
Maryland 21046

Dear Sir

Hitachi hereby introduces Mr. M. Yazdanian of A-Pex to act as its authorised agent regarding certification of a monitor only.

Yours faithfully

O. Miwada

Mr. O. Miwada
Executive Manager - Quality
for and on behalf of
Hitachi Home Electronics (Europe) Ltd