



TESTING
No. 1653

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ISSUE 1

**REPORT ON THE
RFI TESTING OF A
HITACHI HOME ELECTRONICS
21" MCM21P1 MONITOR
WITH RESPECT TO
THE FCC RULES CFR 47: OCT 1995
PART 15 LIMIT 5**

TEST DATE: 30th November 1998.

TESTED BY: *K. Richards.* K. RICHARDS
APPROVED BY: *G. Meek* G. MEEK

Distribution:

Copy Nos: 1 HITACHI HOME ELECTRONICS (EUROPE) LTD
MANUFACTURING DIVISION
2 HHEE/MD - QA EMC LAB

Hitachi Home Electronics (Europe) Ltd
QA EMC Lab
Hirwaun Industrial Estate,
Aberdare,
Mid Glamorgan, CF44 9UY
Telephone: +44(0)1685 811451 FAX: 812733 E-Mail: Gerry-HHEE.Meek@Hitachi-eu.com

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" MCM21P1 MONITOR

EQUIPMENT SERIAL NO: K8346

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: 30th Novmber, 1998.

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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" MCM21P1 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" MCM21P1 MONITOR

Serial No: K8346

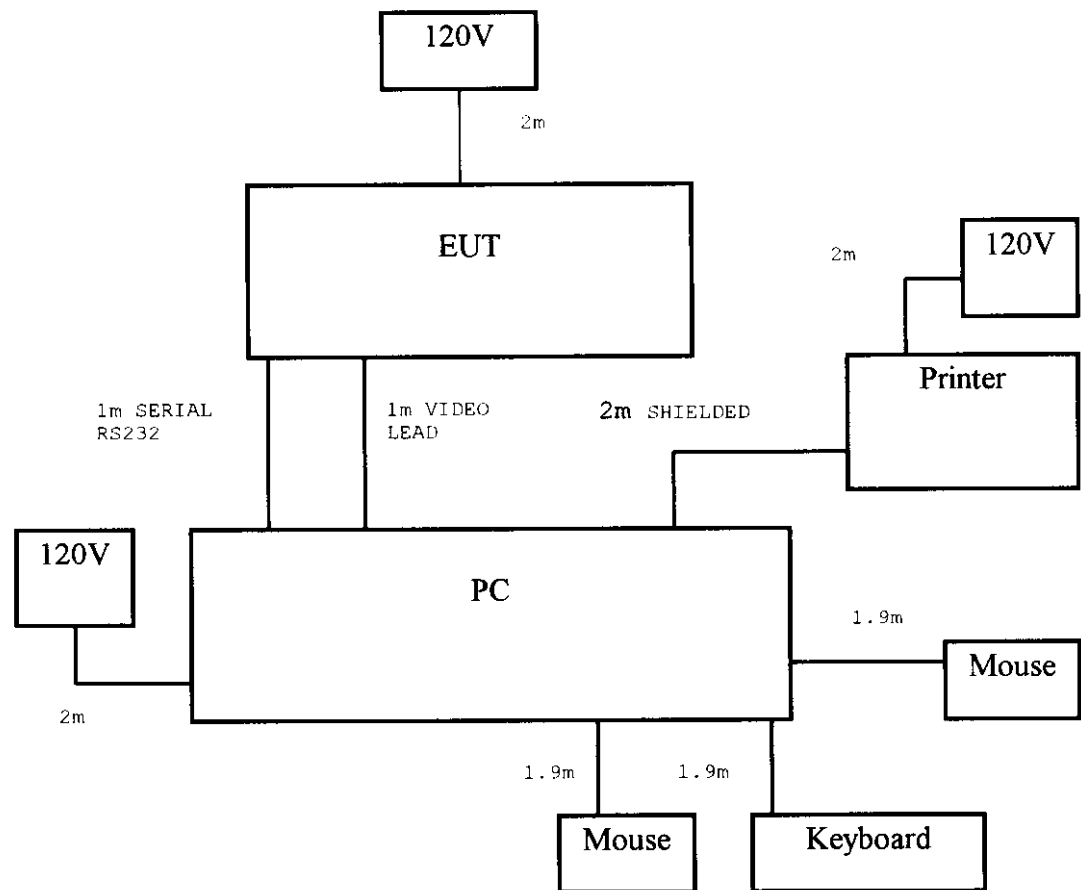
2.2 System Equipment

1. Computer Scenic Pro M5 Serial no: 1087
Siemens NIXDORF
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 Serial no: 2803S01949
ThinkJet Model No 2225CU 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	:-	<p>All measurements were carried out in 3m Semi Anechoic Chamber and calibrated in accordance with ANSI C63-4 1992 document.</p> <p>All significant emissions were maximised by:</p> <ul style="list-style-type: none"> (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 6112A	2447	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 7dB OF THE LIMIT		
Radiated E-Field Emissions (Graph 2)	NO SIGNIFICANT EMISSIONS DETECTED WITHIN 4dB OF THE LIMIT		

4.1 Sample Calculation

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

FREQUENCY (MHz)	MEASURED VALUE (dB μ v)	ANTENNA VALUE (dB)	EMISSION LEVEL (dB μ V/m)
NO SIGNIFICANT EMISSIONS DETECTED WITHIN 4dB 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" MCM21P1 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	±4.3dB
	>300MHz	±4.3dB
CONDUCTED EMISSIONS	PROBE	
AC Power Line	LISN	±1dB
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 7 - DATED 28-11-98

APPENDIX B

PHOTOGRAPHS OF TEST SETUP

APPENDIX C

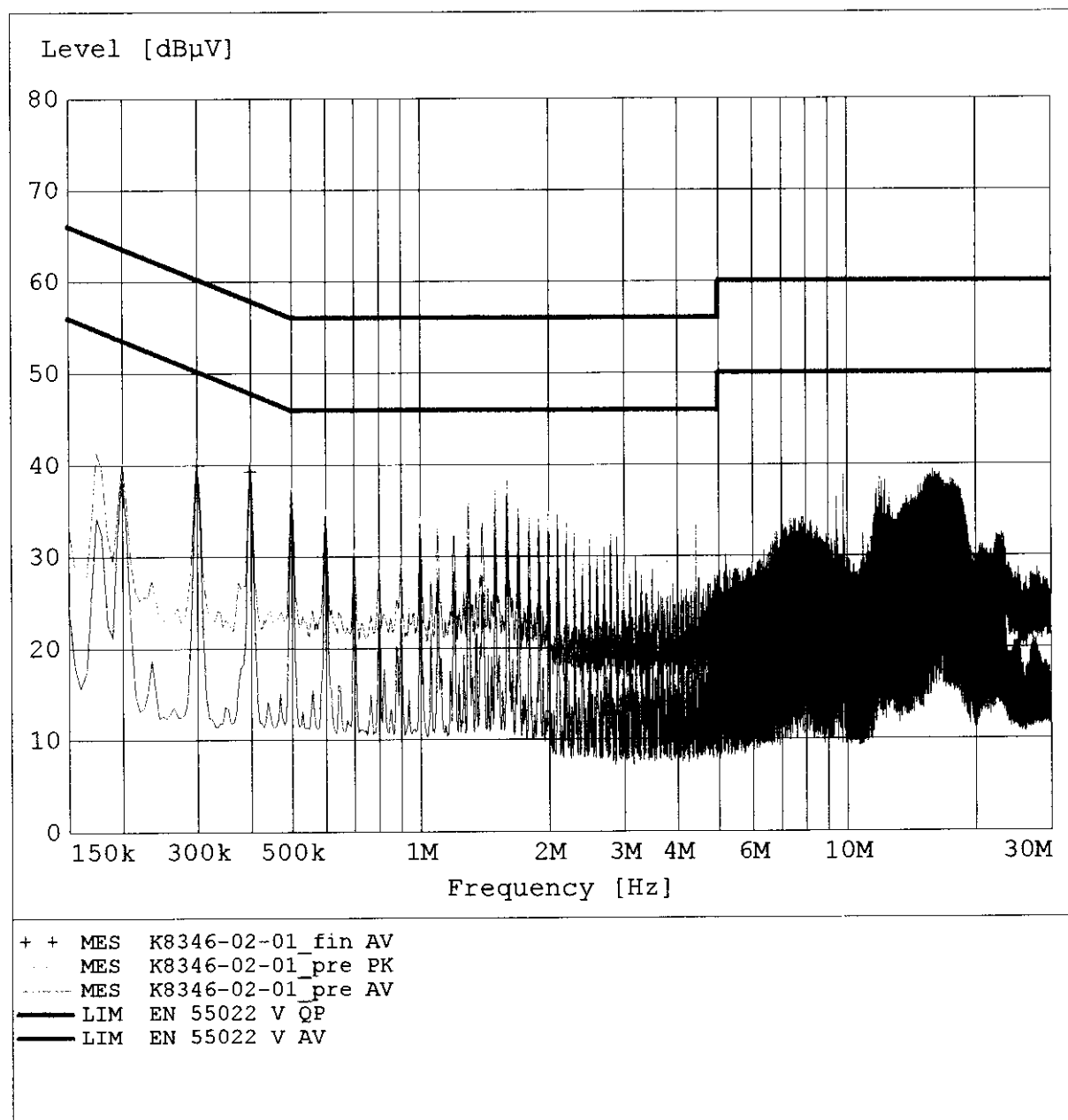
CONDUCTED & RADIATED EMISSIONS TEST DATA

Measurement of Power Line Conducted Emissions
in the frequency range 150KHz to 30MHz - EN55022

EUT / Model No: 21"MDU MCM21P1
 Manufacturer: Hitachi Home Electronics (Europe) Ltd
 Support Equipment: ESMI, ESH3 LISN, Siemens Scenic Pro M5, HP Thinkjet
 Resolution/Scan Rate: 1152x864 H=100KHz, V=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

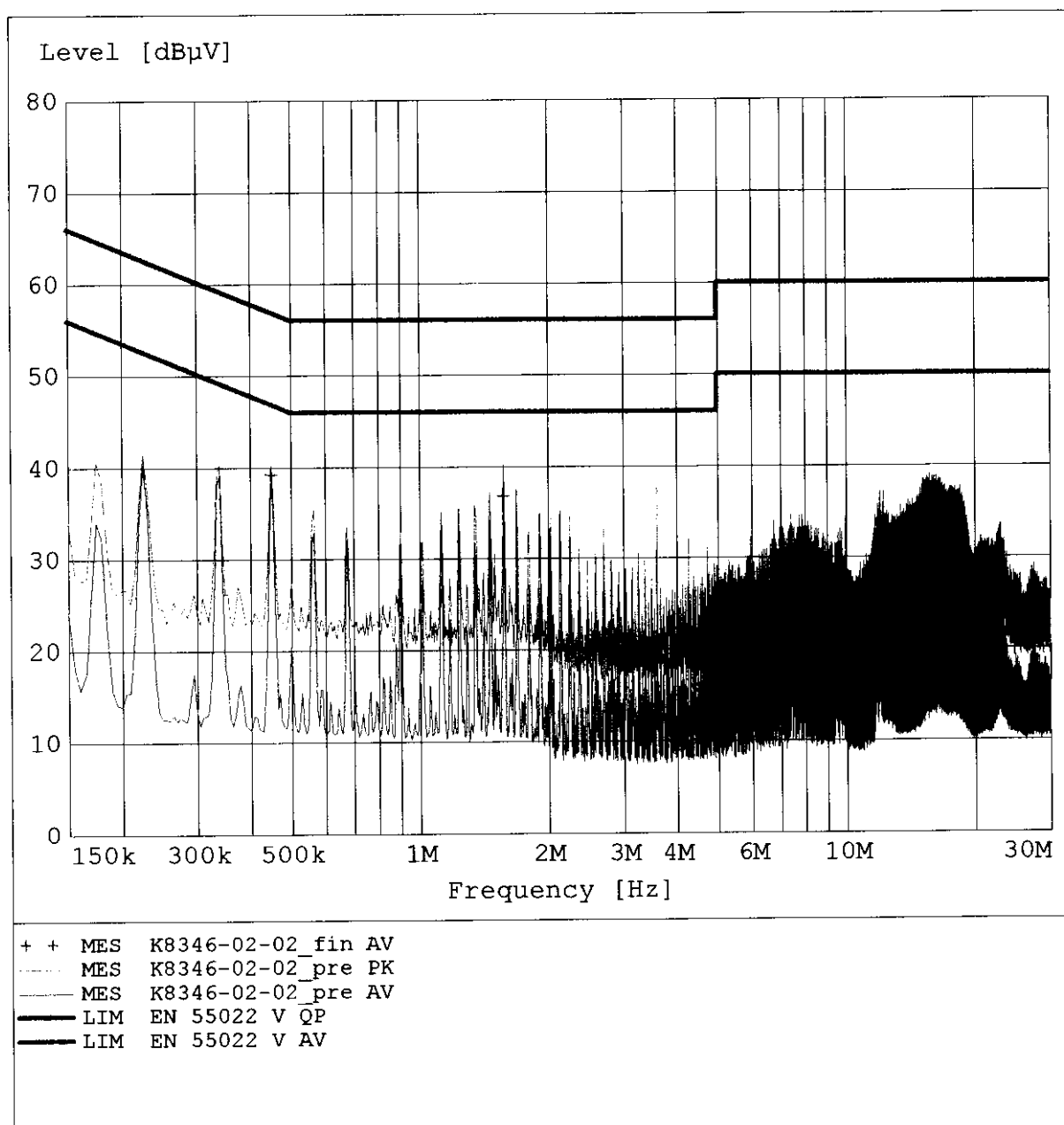


Measurement of Power Line Conducted Emissions
in the frequency range 150KHz to 30MHz - EN55022

EUT / Model No: 21"MDU MCM21P1
 Manufacturer: Hitachi Home Electronics (Europe) Ltd
 Support Equipment: ESMI,ESH3 LISN,Siemens Scenic Pro M5,HP Thinkjet
 Resolution/Scan Rate: 1280x1024 H=107KHz,V=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

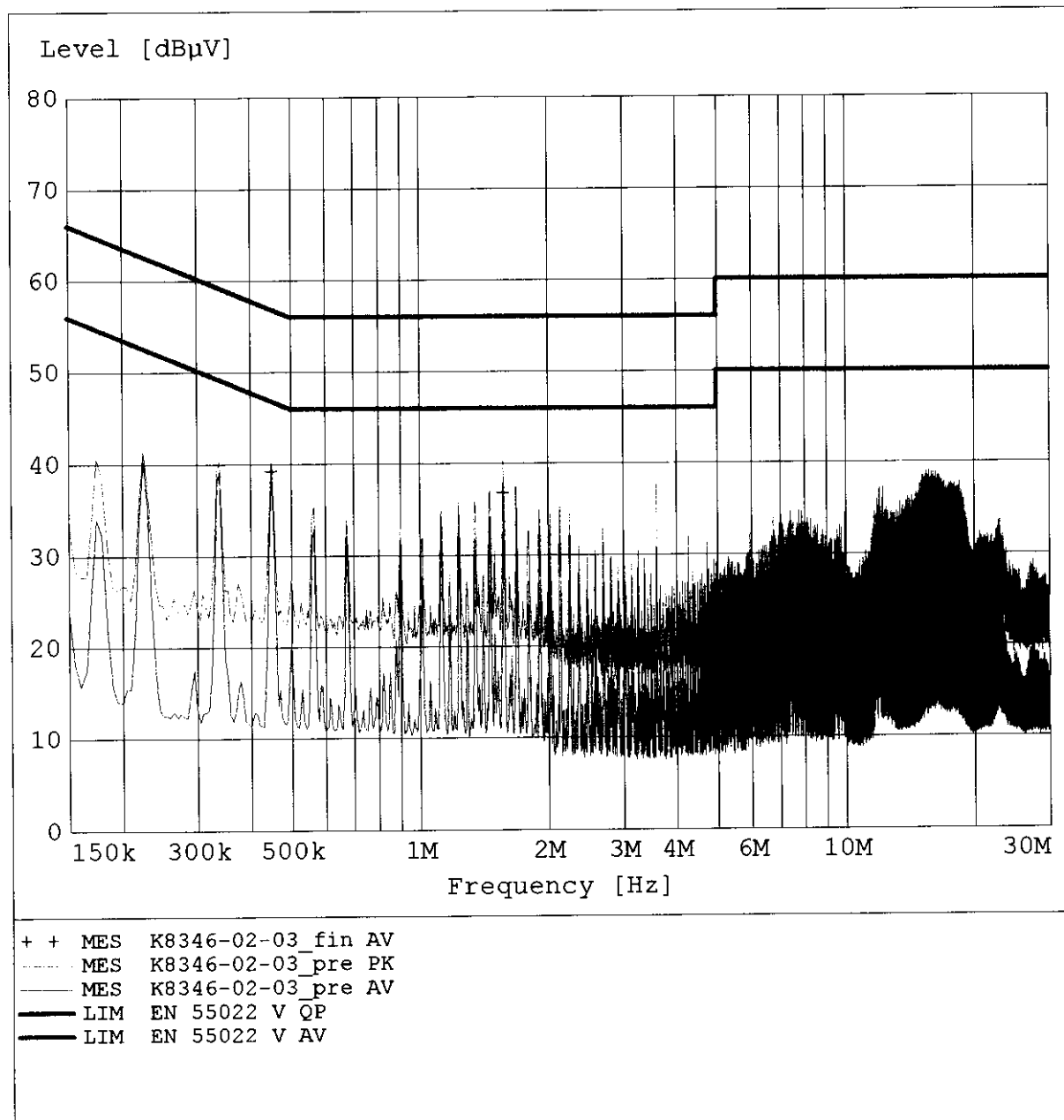


Measurement of Power Line Conducted Emissions
in the frequency range 150KHz to 30MHz - EN55022

EUT / Model No:	21"MDU	MCM21P1
Manufacturer:	Hitachi Home Electronics (Europe) Ltd	
Support Equipment:	ESMI, ESH3 LISN, Siemens Scenic Pro M5, HP Thinkjet	
Resolution/Scan Rate:	1600x1200	H=113KHz, V=90Hz
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	Stop	Step	Detector	Meas.	IF	Transducer
Frequency	Frequency	Width		Time	Bandw.	
150.0 kHz	30.0 MHz	5.0 kHz	MaxPeak	20.0 ms	10 kHz	ESH3-Z5
			Average			

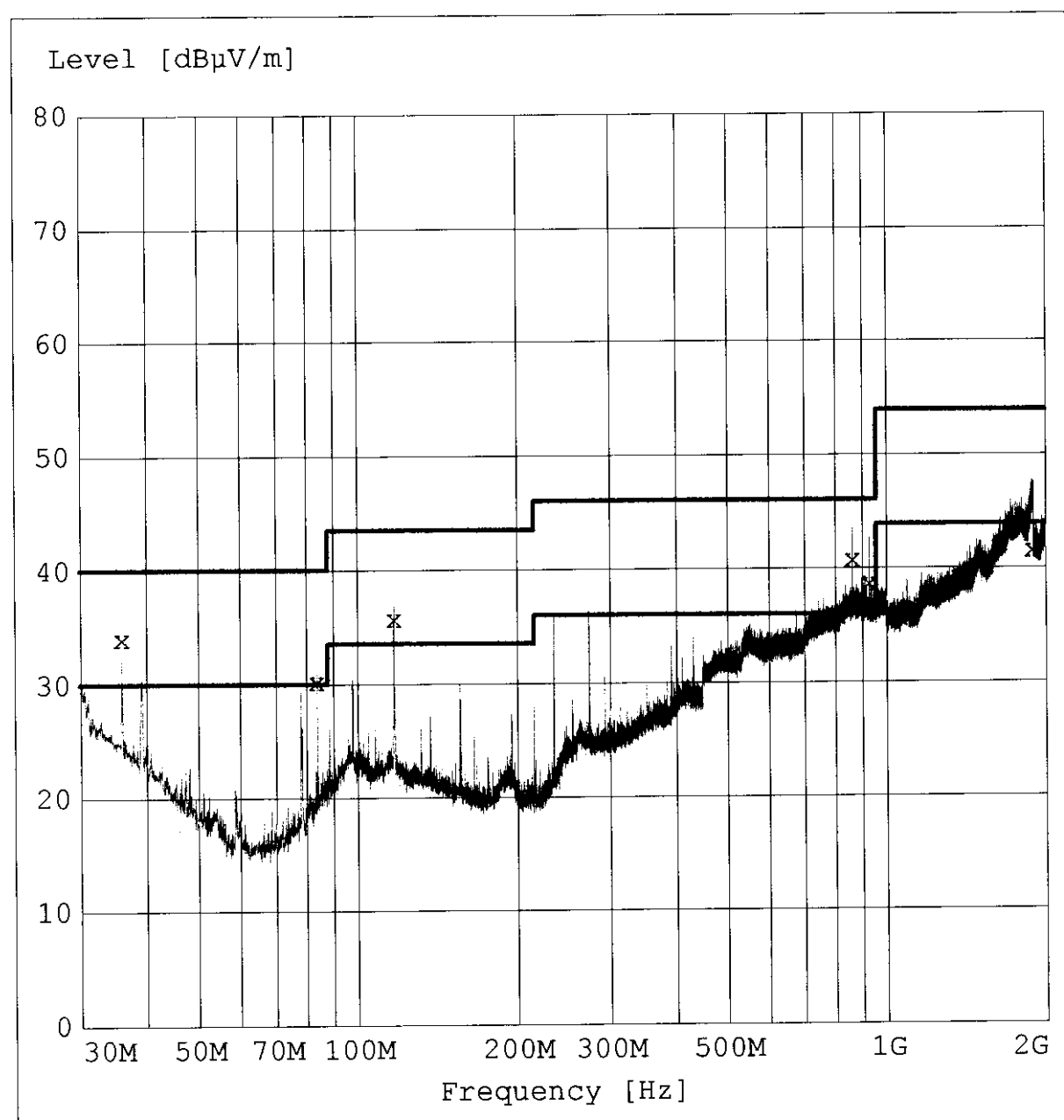


**Measurement of Radiated E-Field Emissions over the
frequency range 30MHz to 2GHz - FCC class B.**

EUT/Model No:: 21"MDU MCM21P1
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=16C,H=50%
Comment: Millenium PowerDoc card fitted.

SCAN TABLE: "FCC B Field"

Short Description:			FCC Class B Radiated E Field			
Start	Stop	Step	Detector	Meas.	IF	Transducer
Frequency	Frequency	Width		Time	Bandw.	
30.0 MHz	2.0 GHz	80.0 kHz	MaxPeak	10.0 ms	120 kHz	CBL 6112

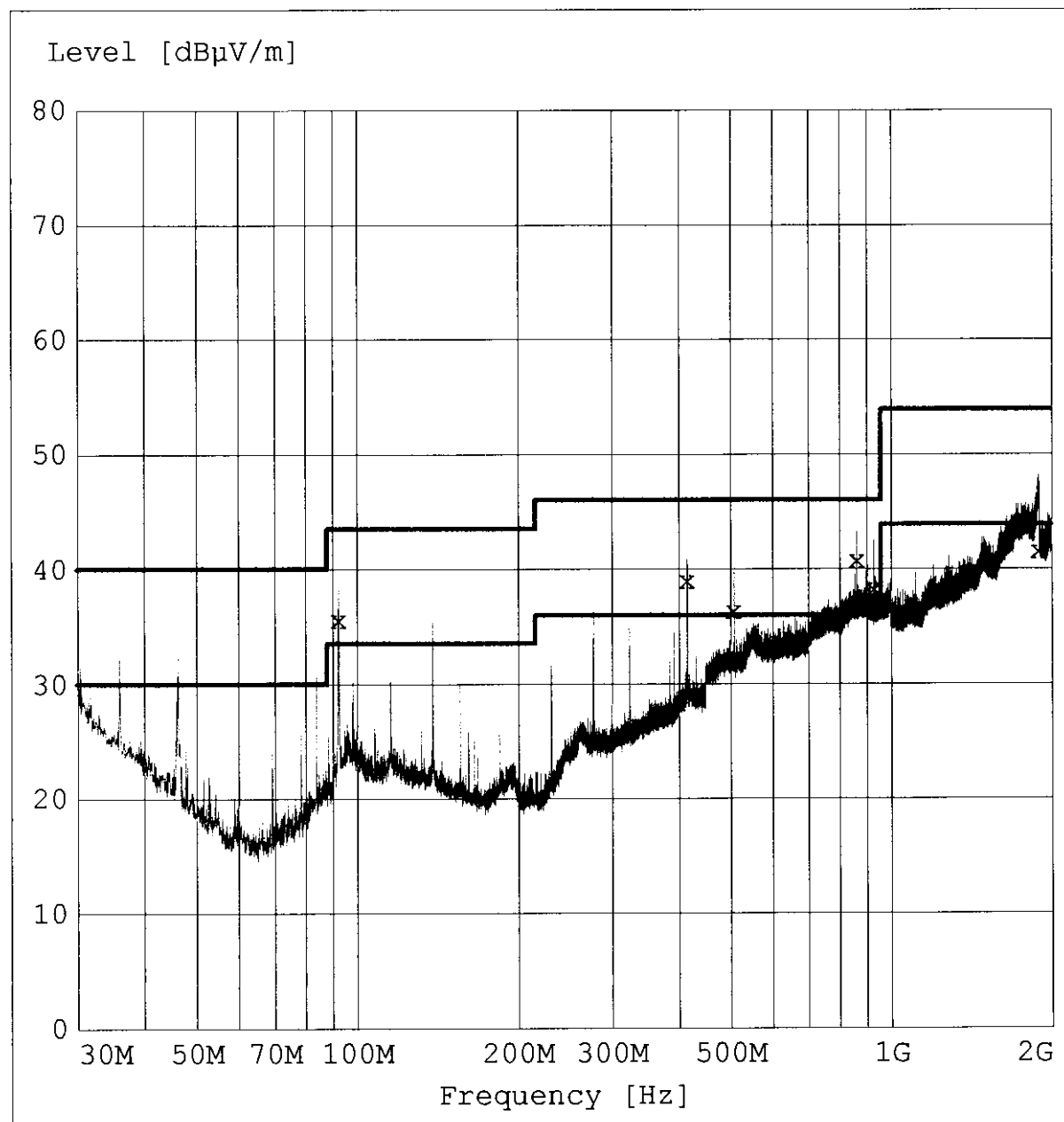


**Measurement of Radiated E-Field Emissions over the
frequency range 30MHz to 2GHz - FCC class B.**

EUT/Model No:: 21"MDU MCM21P1
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=16C,H=50%
Comment: Millenium PowerDoc card fitted.

SCAN TABLE: "FCC B Field"

Short Description:			FCC Class B Radiated E Field			
Start	Stop	Step	Detector	Meas.	IF	Transducer
Frequency	Frequency	Width		Time	Bandw.	
30.0 MHz	2.0 GHz	80.0 kHz	MaxPeak	10.0 ms	120 kHz	CBL 6112

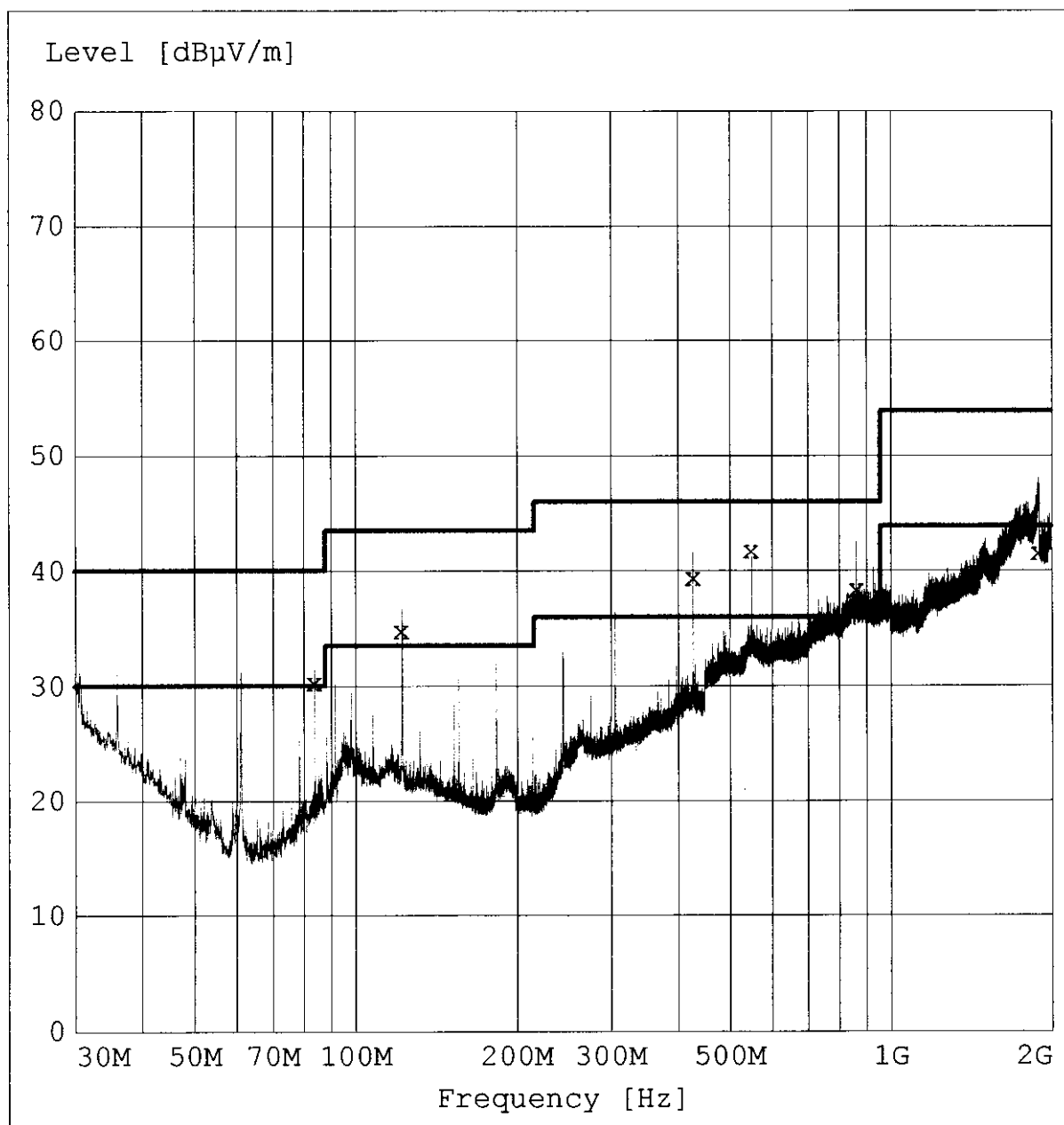


**Measurement of Radiated E-Field Emissions over the
frequency range 30MHz to 2GHz - FCC class B.**

EUT/Model No:: 21"MDU MCM21P1
Manufacturer:: Hitachi Home Electronics (Europe) Ltd.
Support Equipment:: ESMI,CBL6112,Siemens Scenic Pro M5,HP Thinkjet.
Resolution/Scan Rate: 1600x1200 113KHz,90Hz
Test Site/Operator:: Hitachi 3M Anechoic Chamber K.Richards
Adjustment/Mains:: Maximum brightness/contrast 120VAC,60Hz
Pattern/Conditions:: Scrolling`H` T=16C,H=50%
Comment: Millenium PowerDoc card fitted.

SCAN TABLE: "FCC B Field"

Short Description:			FCC Class B Radiated E Field			
Start	Stop	Step	Detector	Meas.	IF	Transducer
Frequency	Frequency	Width		Time	Bandw.	
30.0 MHz	2.0 GHz	80.0 kHz	MaxPeak	10.0 ms	120 kHz	CBL 6112



HITACHI

Hitachi Home Electronics (Europe) Ltd

Ref. 00080

Manufacturing Division

Hirwaun Industrial Estate, Aberdare,
Mid Glamorgan, CF44 9UY
Tel 01685 811451 Fax: 01685 814611

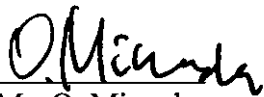
11 January 1999

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



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

HITACHI

FCC ID: M9U9901DJ81MD

Hitachi Home Electronics (Europe) Ltd
Manufacturing Division

Hirwaun Industrial Estate, Aberdare,
Mid Glamorgan, CF44 9UY
Tel 01685 811451 Fax: 01685 814611

Ref. 00082

20 January 1999

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

Dear Sir

Subject: Location of the FCC ID label

This is to declare that the FCC ID label will be located on the rear of the monitor in production.

This FCC ID label will be a part of the equipment identification (rating) label and will be permanently affixed to the equipment.

This location is indicated in Fig. No. **2** within the Form 731 Assembly.

Yours faithfully



Mr. G. Meek
Senior Manager - Quality
for and on behalf of
Hitachi Home Electronics (Europe) Ltd

