

	Report No: R1483	FCC ID: P26RDSRXUS1	
Test No: T0548		<b>Test Report</b>	Page: 1 of 20



**dB Technology**

----- ( Cambridge Ltd. ) -----

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## REPORT ON ELECTROMAGNETIC COMPATIBILITY TESTS

**Performed at:  
TWENTY PENCE TEST SITE**

**Twenty Pence Road,  
Cottenham,  
Cambridge  
U.K.  
CB4 4PS**

**on**

**Thermo Life Sciences Ltd.**

**RDSRXUS1**

**dated**

**21 November 2001**

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### Equipment Under Test (EUT):

RDSRXUS1

Test Commissioned by:

Thermo Life Sciences Ltd.  
Unit 5, The Ringway Centre,  
Edison Road  
Basingstoke  
Hampshire  
RG21 6YH

Representative:

Jerry Walker

Test Started:

16 November 2001

Test Completed:

16 November 2001

## Test Engineer:

Dave Smith

Date of Report:

21 November 2001

## Report:

Written by: **Dave Smith**

Checked by:

Signature:

Signature:

Date:

Date:

## Test Standards Applied

**CFR 47 : 2001**      *Code of Federal Regulations: Pt 15 Subpart B- Radio Frequency Devices - PASS*  
**Class B**      *Unintentional Radiators*

Note: although the class B limits were applied throughout, the EUT was a composite device consisting of an RF receiver and a Class A peripheral to a PC.

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## Emissions Test Results Summary

CFR 47 : 2001

Test	Port	Method	Limit	PASS/FAIL	PASS	Notes
Conducted Emissions	ac power	ANSI C63.4:1992	FCC_B	PASS		
Radiated Emissions		ANSI C63.4:1992	FCC_B	PASS		

Note: although the class B limits were applied throughout, the EUT was a composite device consisting of an RF receiver and a Class A peripheral to a PC.

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## 1 EUT Details

### 1.1 General

The EUT was a Thermo Life Sciences RDSRXUS1. The an RF receiving station for a remote electronic temperature probe with a radio transmitter (RDSTXUS1). The radio link operates at a frequency of 914.5MHz. The local oscillator frequency is 903.8MHz. The unit is mains powered. It also has a modem interface and a serial port which may be connected to a PC. The unit is not intended to be used in domestic locations. The EUT was therefore considered as a composite device consisting of an RF receiver and a Class A peripheral to a PC.

Details of the EUT and associated peripherals used during the tests are listed below. Figure 1 shows the interconnections between the EUT and peripherals.

Item	Manufacturer	Model	Description	Serial No:	FCC ID
	Themo Life Sciences	RDSRXUS1	EUT	10027	P26RDSRXUS1
	Elonex	Lumina	PC	PP8102493B	EUNSYSOASIS
	Olivetti	CDU1438GN/GS01	Monitor	7042366	BEJCY410
	Elonex	SK-1100CW	Keyboard		GYUR31SK
	Dell	M-S34-6MD	Mouse		DZL210472
	Hewlett Packard	DeskJet 890C	Printer	SG83C1G0H5	B94C4602X

### 1.2 Modifications to EUT and Peripherals

Details of any modifications that were required to achieve compliance are listed below. The modification numbers are referred to in the results sections as appropriate.

Mod No:	Details
0	Original unit - no modifications were made during the course of testing.

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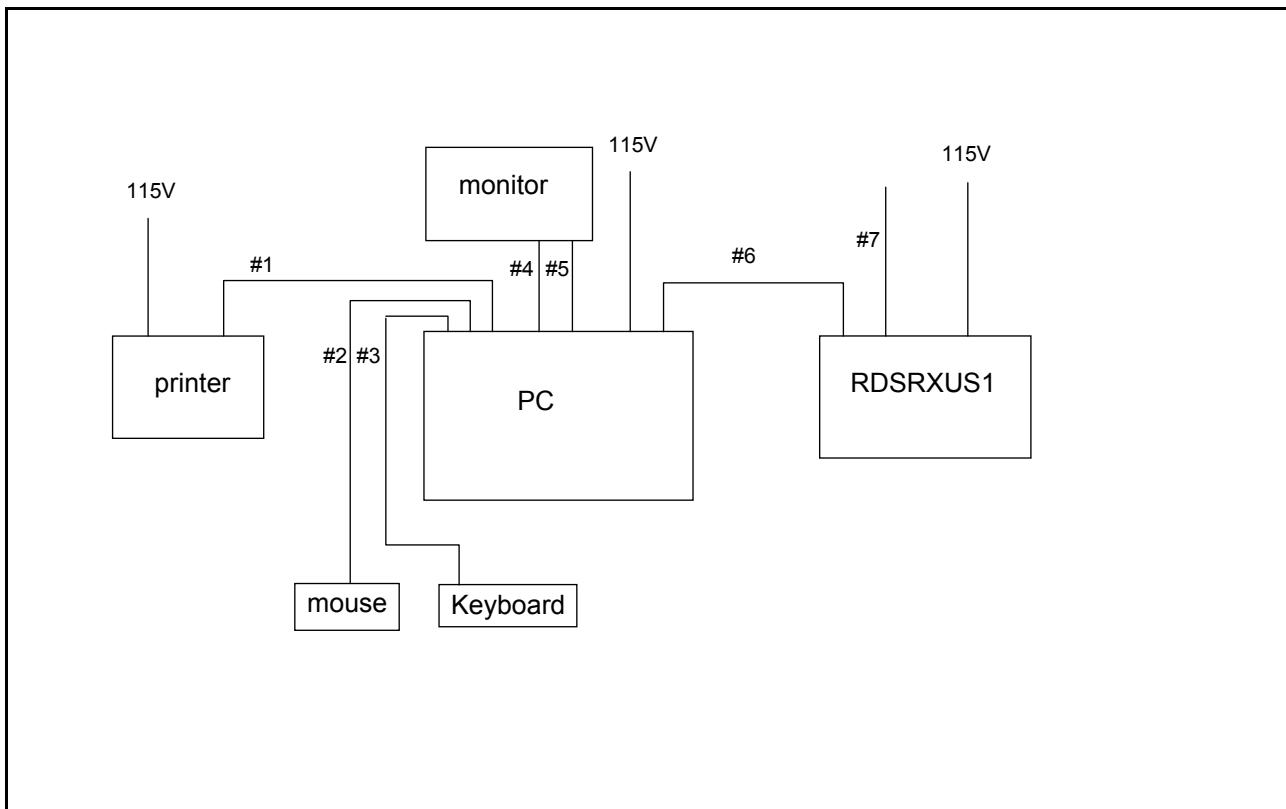
### 1.3 EUT Operating Modes

The EUT was tested in the following operating mode or modes. Generally, operating modes are chosen that will exercise the functions of the EUT as fully as possible and in a manner likely to produce maximum emission levels or susceptibility. Individual test result sheets reference the operating mode of the EUT.

Operating Mode	Details
1	Normal operating mode with RF receiver permanently active.

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**Figure 1 General Arrangement of EUT and Peripherals**

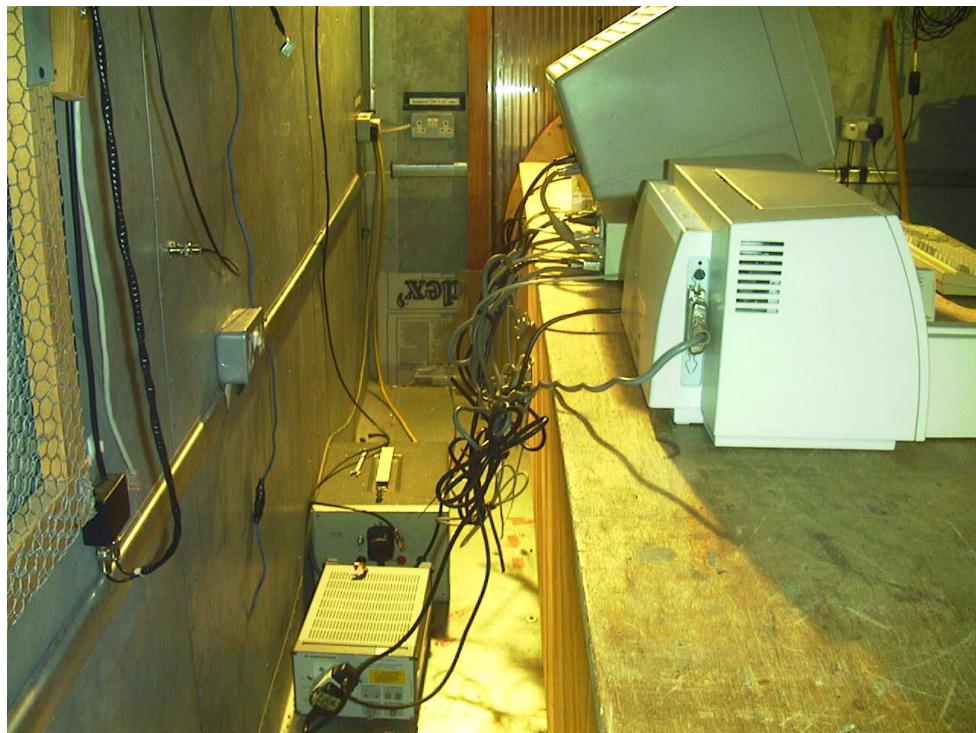


- #1 Screened printer cable - 2m
- #2 Screened mouse cable - 1.5m
- #3 Screened keyboard cable - 1m
- #4 screened monitor video cable - 1m
- #5 unscreened monitor power - 1m
- #6 screened serial cable - 2m
- #7 unscreened modem cable - 2m

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**Photograph 1 Conducted Emissions - Front**



**Photograph 2 Conducted Emissions - Back**

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**Photograph 3 Radiated Emissions - Front**



**Photograph 4 Radiated Emissions - Back**

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## 2 Test Equipment

The test equipment used during the tests was one or more of the items listed below. Individual test result sheets indicate which items were used.

Ref No:	Manufacturer	Model	Description	Serial Number	Cal Due
R1	Chase	LHR7000	RF Receiver (10kHz -30MHz)	1056	12 December 2001
R4	Rohde and Schwarz	ESVS10	RF Receiver (20MHz - 1GHz)	843744/00	4 December 2001
R5	Hewlett Packard	HP 8595E	Spectrum Analyser	3412A00701	5 November 2002
R5B	Hewlett Packard	HP87405A	Pre-amp	3207A00322	5 November 2002
L1	EMCO	3825/2	LISN	1358	29 March 2002
L2	Rohde and Schwarz	ESH3-Z5	LISN	843862/009	29 March 2002
A3	EMCO	3147	HF Log Per. Antenna (200MHz - 5GHz)	9207-1096	20 May 2002
A4	Chase	CBL6112	Bilog Antenna (30MHz - 2GHz)	2027	20 May 2002
A5	Chase	CBL111A	Bilog Antenna (30MHz - 1GHz)	1760	20 May 2002

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### 3 Test Methods

#### 3.1 Conducted Emissions - ac power

This section describes the general method of performing this test. The specific method used and any deviations from this general method are listed in the appropriate results section.

Bench top EUTs and peripheral equipment are normally placed on a 0.8m high non-conducting bench, positioned 0.4m from one of the metallic walls of a screened room. Floor standing EUTs are normally placed 0.1m above the metallic floor of the screened room. Mains leads are bundled so as not to exceed 1m.

The EUT is powered using a 50ohm/50uH Line Impedance Stabilisation Network (LISN). Peripherals are powered using a second a 50ohm/50uH LISN.

With the correct supply voltage applied to the EUT scans are performed on both the live and neutral line outputs of the LISN using quasi-peak detection over the specified frequency range. The results of these scans are shown in the plots section at the end of the report.

Significant emissions identified by the scans are measured and the results tabulated. The table of results is shown in the conducted emissions results section.

#### 3.2 Radiated Emissions

This section describes the general method of performing this test. The specific method used and any deviations from this general method are listed in the appropriate results section.

Initial scans are performed in a semi-anechoic screened room at a distance of 3m. Scans are performed over the frequency range specified in the test standard with the antenna both horizontally and vertically polarised. During these scans the EUT and peripherals are rotated through 360° and cable positions adjusted to obtain maximum emissions. Bench top EUTs are placed on a non-conducting bench at a height of 0.8m above the ground plane. Floor standing EUTs are placed 0.1m above the ground plane. The results of the scans are shown in the plots included at the end of the report.

For frequencies below 1GHz, significant emissions identified by the scans are measured on an open area test site at the appropriate test distance using a CISPR16 quasi-peak receiver. Maximised readings are obtained by rotating the EUT through 360° and adjusting the height of the antenna from 1m to 4m. Measurements are made with the antenna both horizontally and vertically polarised and the results tabulated.

For frequencies above 1GHz the methods used to obtain final measurements are indicated in the individual results sections.

### 4 Test Results

The following sections contain tabulated test results. Plots of various scans are included at the back of this section.

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## 4.1 Conducted Emission Results

Test Equipment:	Factor Set 1:	EMLISN	RG214	10 m cable
-----------------	---------------	--------	-------	------------

### Conducted Emissions

Company:	Thermo Life Sciences Ltd.			Product:	RDSRXUS1												
Date:	16 November 2001			Test Eng:	Dave Smith												
Ports:	ac power			Test:	ANSI C63.4:1992 using limits of FCC B												
Ports:				Test:													
Test	Op Mode	Mod State	Line (L/N)	Fact Set	Freq. MHz	Det qp/av	Rec. Level dBuV	Corr'n Factor dB	Total Level dBuV	Limit FCC_B dBuV	Margin FCC_B dB	Limit	Margin	Notes			
1	0	N	N	1	16.000	qp	18.3	0.2	18.5	48.0	29.5						
1	0	N	N	1	24.000	qp	37.4	0.3	37.7	48.0	10.3						
1	0	L	L	1	16.138	qp	27.0	0.2	27.2	48.0	20.8						
1	0	L	L	1	24.003	qp	37.1	0.3	37.4	48.0	10.6						
<b>Results</b>				<b>Minimum Margin PASS/FAIL</b>			<b>10.3 dB</b>										
Notes	Comments and Observations																
#1	<p>Results of scans shown in plot 1 and 2.</p> <p>The class B limits were used throughout - the digital device part of the system is actually a class A peripheral for which the limits are higher.</p>																

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## 4.2 Radiated Emissions Results

Test Equipment:	Factor Set 1:	HFBLOG	RG214	25 m cable
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### Radiated Emissions

Company:	Thermo Life Sciences Ltd.				Product:				RDSRXUS1											
Date:	16 November 2001				Test Eng:				Dave Smith											
Ports:																				
Test:	ANSI C63.4:1992 using limits of FCC B																			
Ports:																				
Test:																				
Test	Op	Mod	Dist	Fact	Freq.	Ant	Rec.	Corr'n	Total	Limit	Margin	Limit	Margin	Notes						
	Mode	State	m	Set	MHz	Pol	Level	Factor	Level	FCC_B	FCC_B									
							dBuV	dB/m	dBuV/m	dBuV/m	dB									
1	0	3	1		40.050	H	9.2	13.9	23.1	40.0	16.9									
1	0	3	1		40.050	V	13.0	13.9	26.9	40.0	13.1									
1	0	3	1		54.528	H	11.2	8.0	19.2	40.0	20.8									
1	0	3	1		54.528	V	20.9	8.0	28.9	40.0	11.1									
1	0	3	1		149.711	H	24.9	12.6	37.5	43.5	6.0									
1	0	3	1		149.711	V	21.5	12.6	34.1	43.5	9.4									
1	0	3	1		220.006	H	16.3	11.7	28.0	46.0	18.0									
1	0	3	1		220.006	V	14.6	11.7	26.3	46.0	19.7									
1	0	3	1		329.366	H	18.2	17.7	35.9	46.0	10.1									
1	0	3	1		329.366	V	21.4	17.7	39.1	46.0	6.9									
1	0	3	1		361.295	H	15.1	18.7	33.8	46.0	12.2									
1	0	3	1		361.295	V	17.3	18.7	36.0	46.0	10.0									
1	0	3	1		389.234	H	16.1	19.5	35.6	46.0	10.4									
1	0	3	1		389.234	V	16.8	19.5	36.3	46.0	9.7									
1	0	3	1		476.124	H	11.6	21.5	33.1	46.0	12.9									
1	0	3	1		476.124	V	10.0	21.5	31.5	46.0	14.5									
Results					Minimum Margin PASS/FAIL				6.0	dB										
Notes	Comments and Observations																			
	Results of screened room scans shown in plot 3, 4 and 5. Plots 6 and 7 show results with the PC and peripherals not powered.																			
	The plots showed no identifiable emissions above 1GHz or emissions related to the receiver local oscillator. Scans were performed up to 2GHz which covers the second harmonic of the local oscillator as required by section 15.33(3).																			
	The class B limits were used throughout - the digital device part of the system is actually a class A peripheral for which the limits are higher.																			

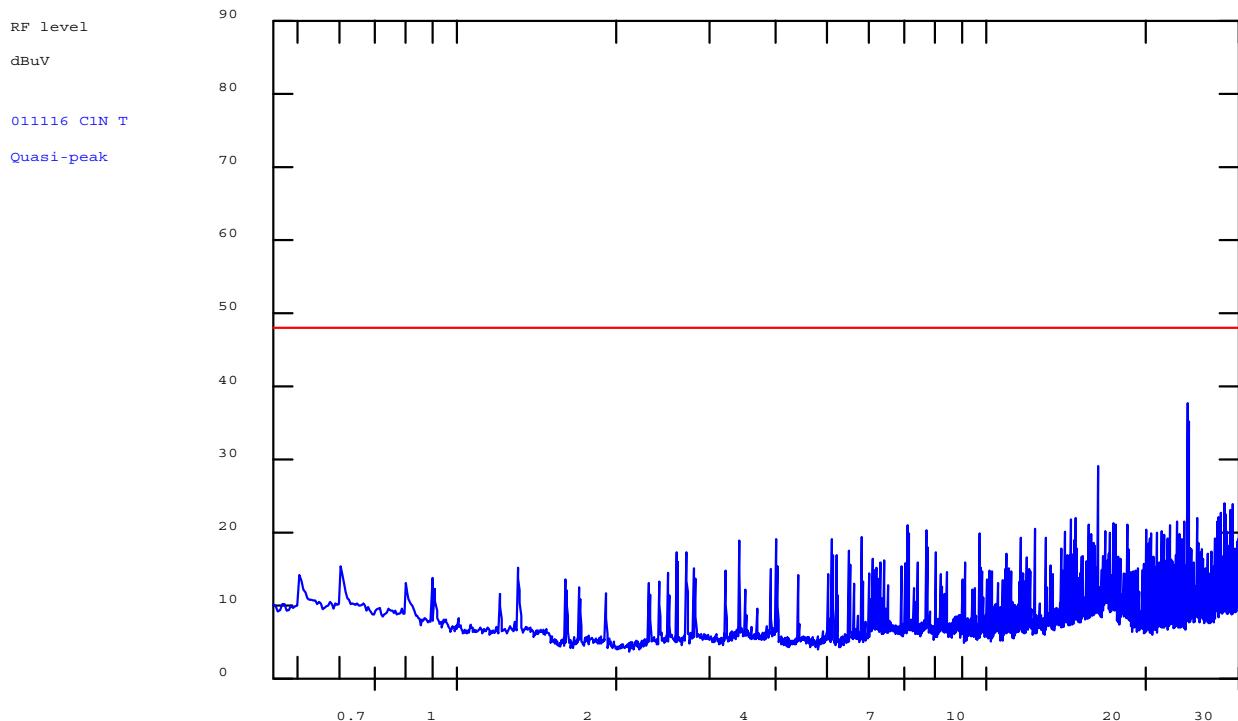
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Chase EMS 6.21

Notes

Analyse 011116 C1N Thermo Life Sciences - RDS1RXUS

Test: EN55022(B) &amp; Vfg243/1991 Mains Cond (QP Det)



Log Freq. (0.45 - 30) MHz

Limit FCC B (Subpart B) Conduct

## PLOT 1 Conducted Emissions - Neutral Line

Company:	Thermo Life Sciences	Product:	RDSRXUS1
Date:	16 Nov 01	Test Engineer:	Dave Smith
Test:	FCC pt 15	Limit:	FCC (B) QP
Notes:			
Line:	Neutral	Attenuator:	10dB PAD
Detector:	QuasiPeak	Operating Mode:	1
LISN:	EMCO	Mod. State:	0
Filename:	C1B16741.plt		

### Frequency List (MHz)

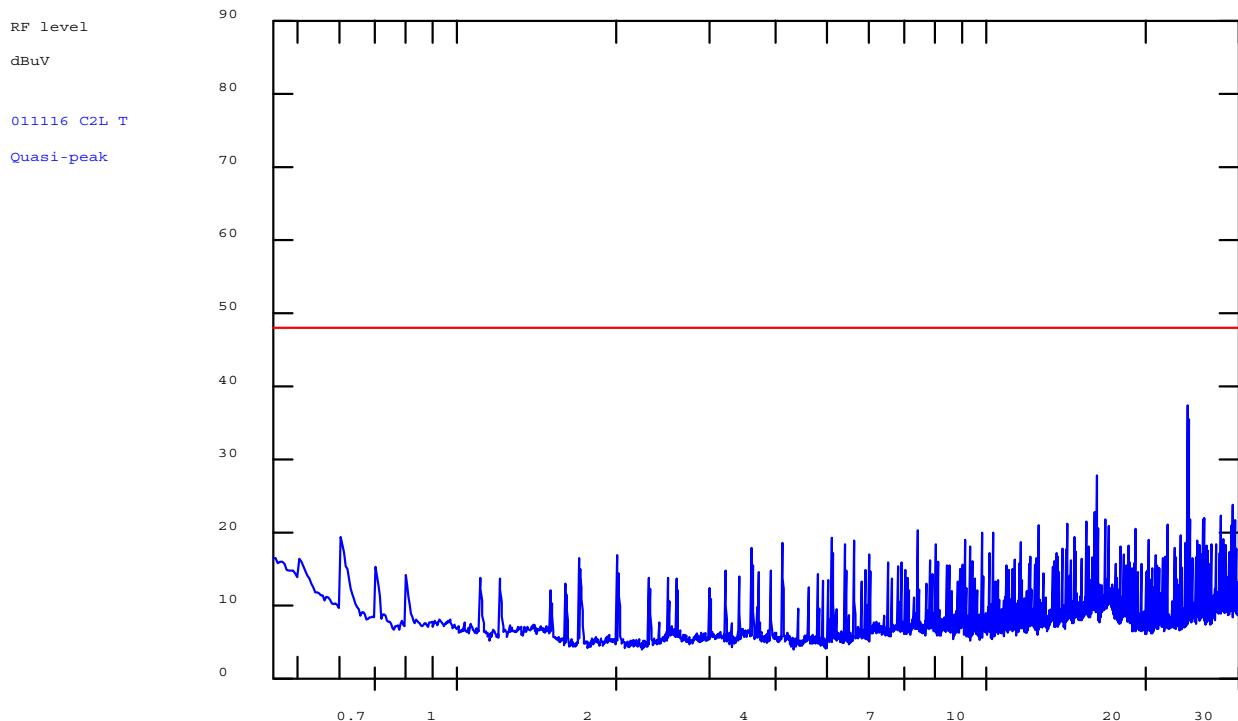

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Chase EMS 6.21

Notes

Analyse 011116 C2L Thermo Life Sciences RDS-1RXUS

Test: EN55022(B) &amp; Vfg243/1991 Mains Cond (QP Det)



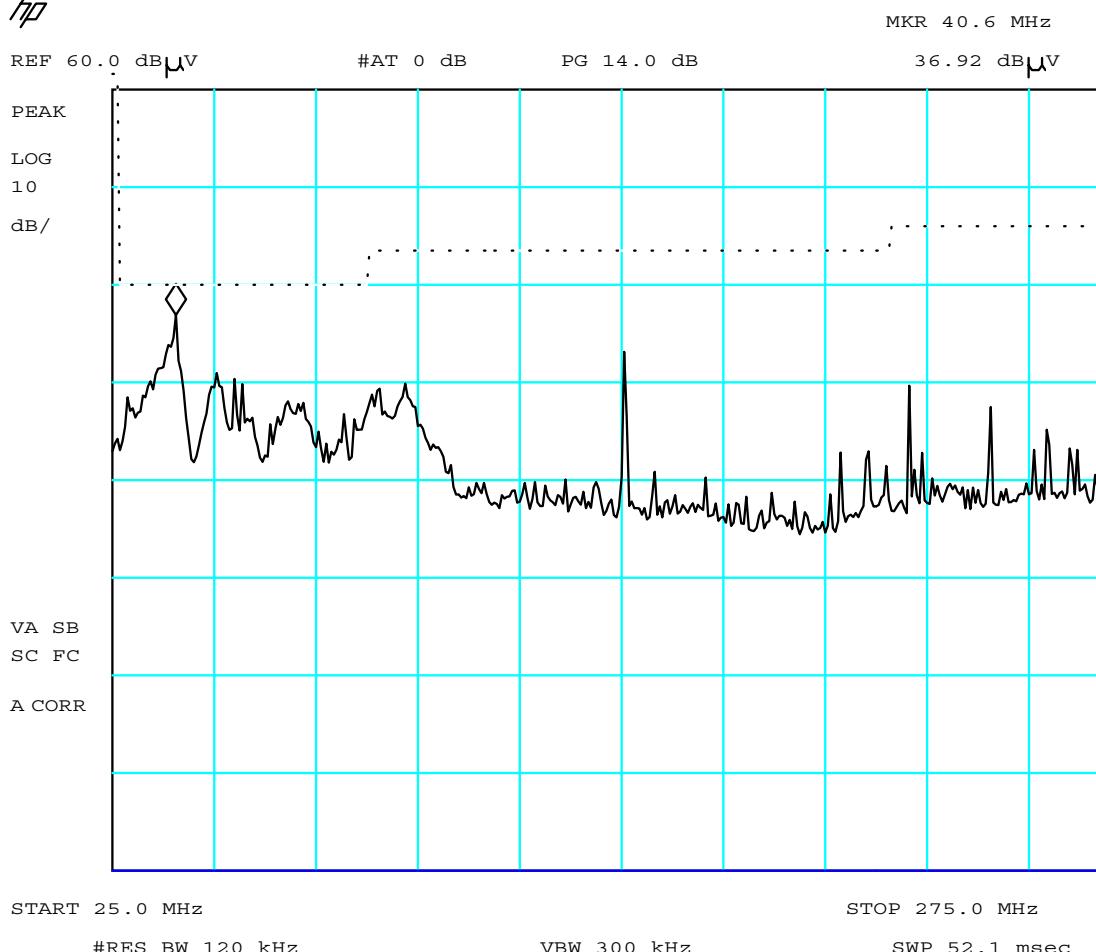
## PLOT 2 Conducted Emissions - Live Line

Company:	Thermo Life Sciences	Product:	RDSRXUS1
Date:	16 Nov 01	Test Engineer:	Dave Smith
Test:	FCC pt 15	Limit:	FCC (B) QP
Notes:			
Line:	Live	Attenuator:	10dB PAD
Detector:	QuasiPeak	Operating Mode:	1
LISN:	EMCO	Mod. State:	0
Filename: C1B16753.plt			

### Frequency List (MHz)


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HP



### PLOT 3 Radiated Emissions - 25MHz to 275MHz

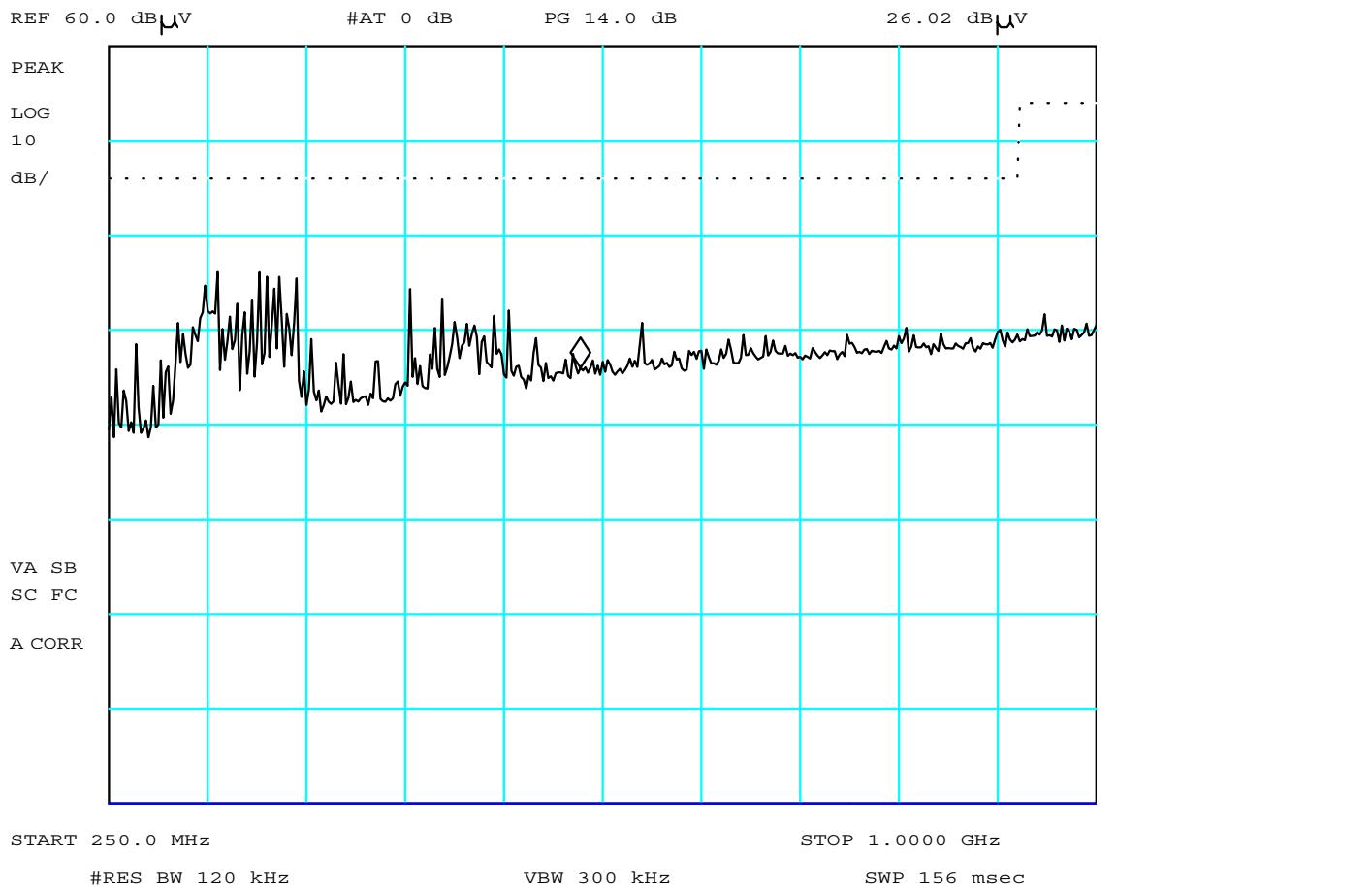
Company:	Thermo Life Sciences	Product:	RDSRXUS1
Date:	16 Nov 01	Test Engineer:	Dave Smith
Test:	FCC pt 15	Limit:	FCC (B)
Notes:			
Full system - with PC and peripherals. Olivetti monitor.			
Polarisation:	V + H	Orientation:	0 - 360°
Distance:	3m	Antenna:	Bilog
Height:	1m	Filename:	H1B164EB.plt

### Frequency List (MHz)


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/p

MKR 608.1 MHz



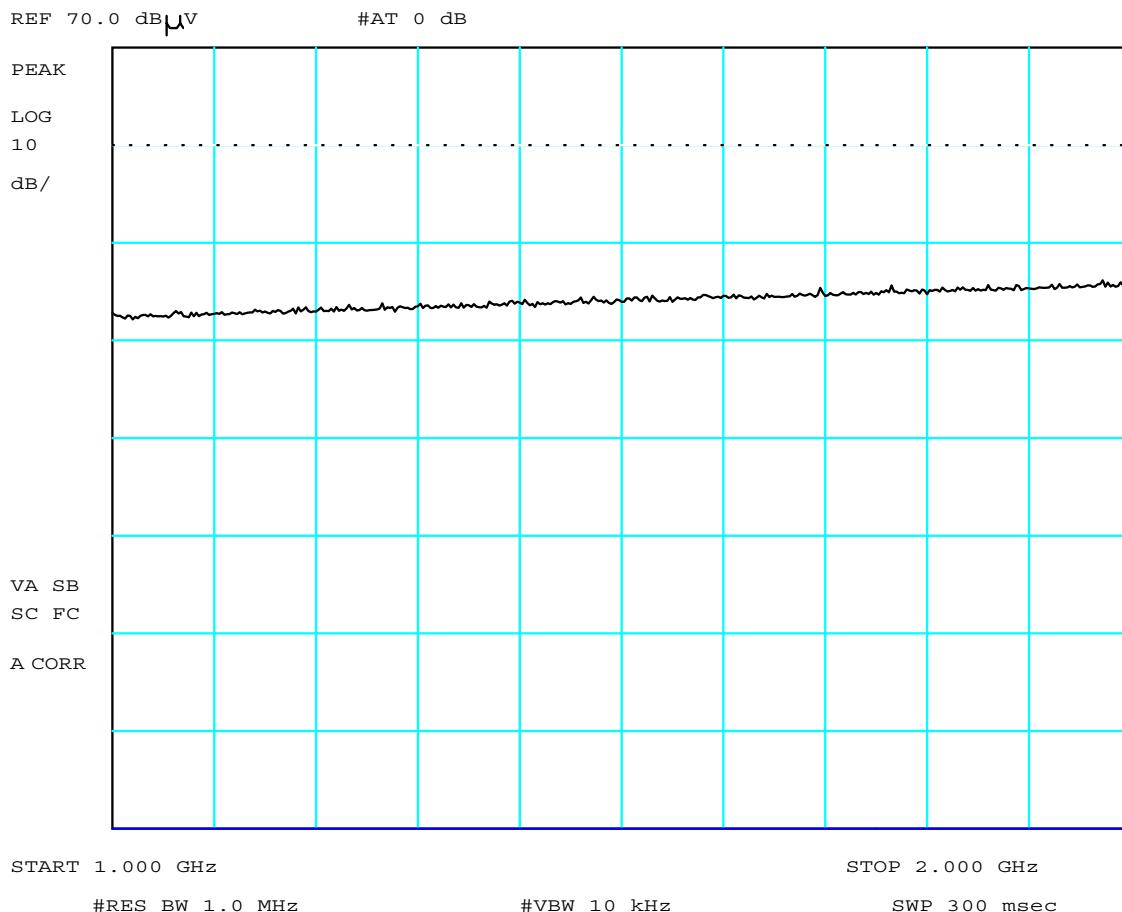
#### PLOT 4 Radiated Emissions - 250MHz to 1GHz

Company:	Thermo Life Sciences	Product:	RDSRXUS1
Date:	16 Nov 01	Test Engineer:	Dave Smith
Test:	FCC pt 15	Limit:	FCC (B)
Notes:			
Full system - with PC and peripherals. Olivetti monitor.			
Polarisation:	V + H	Orientation:	0 - 360°
Distance:	3m	Antenna:	Bilog
Height:	1m	Filename:	H1B164FE.plt

#### Frequency List (MHz)


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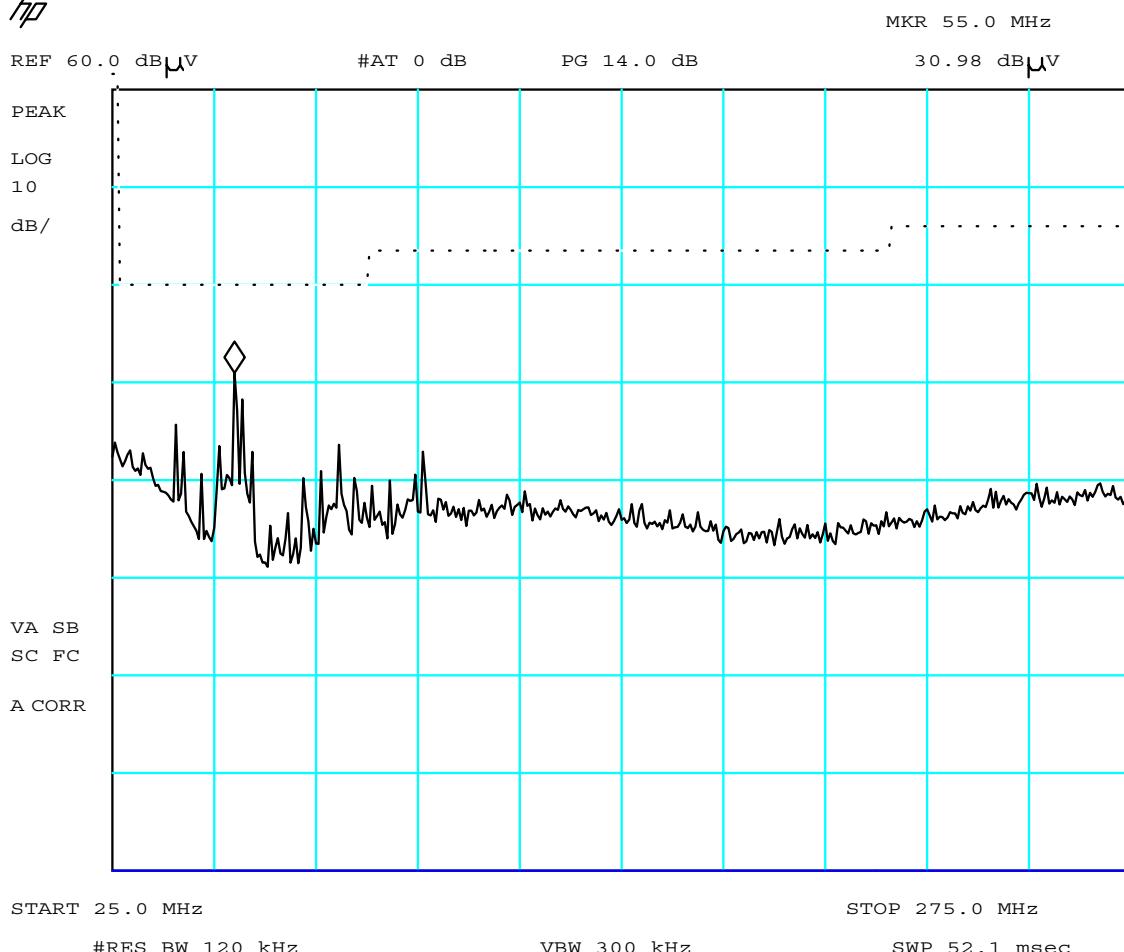
### PLOT 5 Radiated Emissions - 1GHz to 2GHz

Company:	Thermo Life Sciences	Product:	RDSRXUS1
Date:	16 Nov 01	Test Engineer:	Dave Smith
Test:	FCC pt 15	Limit:	FCC (B)
Notes:			
Full system - with PC and peripherals.			
Olivetti monitor.			
Limits adjusted for 1.5m test.			
Polarisation:	V + H	Orientation:	0 - 360°
Distance:	1.5m	Antenna:	HF Log Per
Height:	1m	Filename:	H1B1656B.plt

### Frequency List (MHz)


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HP



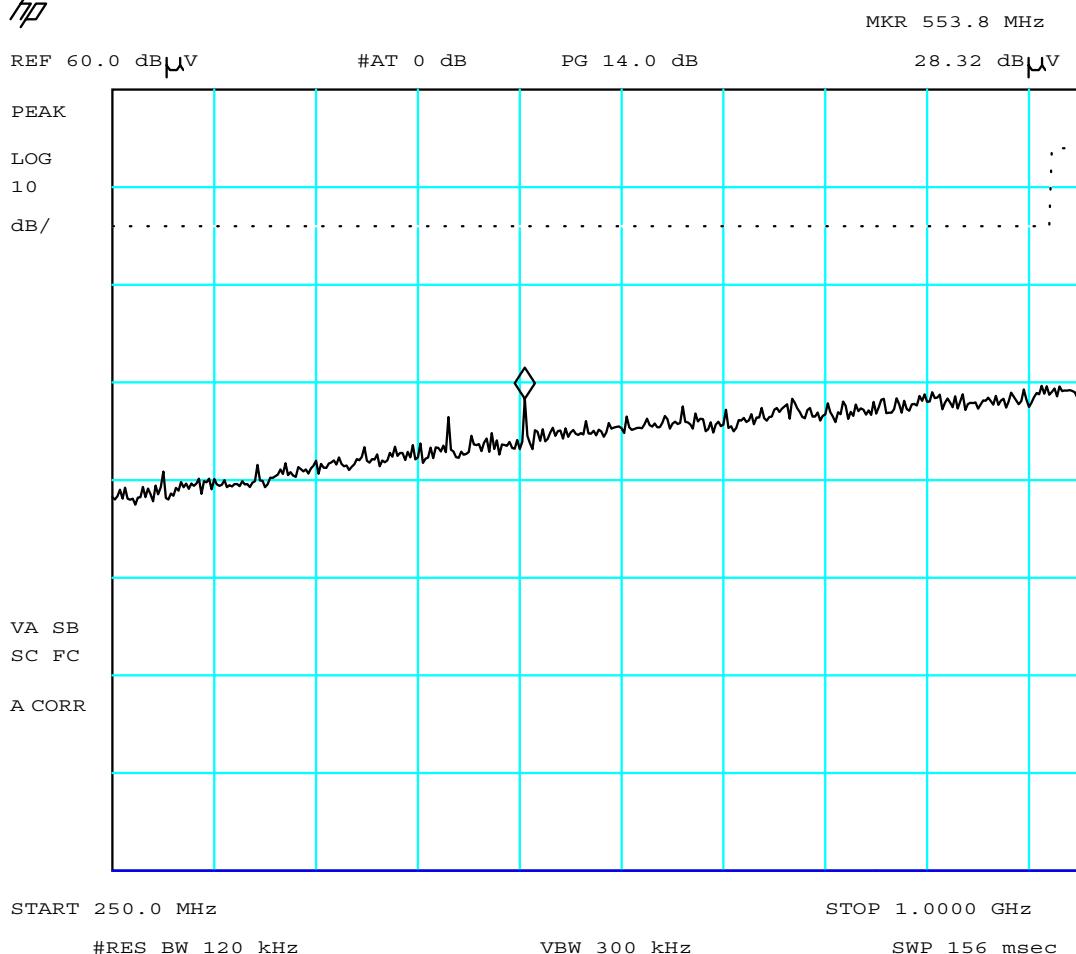
## PLOT 6 Radiated Emissions - Peripherals Not Powered - 25MHz to 275MHz

Company:	Thermo Life Sciences	Product:	RDSRXUS1
Date:	16 Nov 01	Test Engineer:	Dave Smith
Test:	FCC pt 15	Limit:	FCC (B)
Notes:			
Full system - with PC and peripherals.			
Olivetti monitor.			
All peripherals not powered.			
Polarisation:	V + H	Orientation:	0 - 360°
Distance:	3m	Antenna:	Bilog
Height:	1m	Filename:	H1B1651D.plt

### Frequency List (MHz)


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### PLOT 7 Radiated Emissions - Peripherals Not Powered - 250MHz to 1GHz

Company:	Thermo Life Sciences	Product:	RDSRXUS1
Date:	16 Nov 01	Test Engineer:	Dave Smith
Test:	FCC pt 15	Limit:	FCC (B)
Notes:			
Full system - with PC and peripherals. Olivetti monitor. All peripherals not powered.			
Polarisation:	V + H	Orientation:	0 - 360°
Distance:	3m	Antenna:	Bilog
Height:	1m	Filename:	H1B16520.plt

### Frequency List (MHz)
