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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.

RDSTXUS1

dated

12 December 2001

Equipment Under Test (EUT):	RDSTXUS1
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:	12 December 2001
Test Engineer:	Dave Smith
Date of Report:	12 December 2001
Report:	
Written by: Dave Smith	Checked by: Derek Barlow
Signature:	Signature:
Date: 12 December 2001	Date: 12 December 2001

Test Standards Applied

CFR 47 : 2001	*Code of Federal Regulations: Pt 15 Subpart C - Radio Frequency Devices - Intentional Radiators*	**PASS**

Emissions Test Results Summary

CFR 47 : 2001 **PASS**

Test	Port	Method	Limit	PASS/FAIL	*Notes*
Conducted Emissions	ac power	ANSI C63.4:1992	FCC_C	N/A	#1
Radiated Emissions		ANSI C63.4:1992	FCC_C	PASS	#2

#1 Test not applicable because EUT was battery powered and had no ac power port.

#2 Tested to limits of section 15.249.

Contents

1 EUT Details

1.1 General

The EUT was a Thermo Life Sciences RDSTXUS1. The device is an electronic temperature probe with a radio transmitter which relays temperature readings back to a receiving station (RDSRXUS1). The radio link operates at a frequency of 914.5MHz and was tested under the requirements of section 15.249 of the CFR 47 rules. The unit is battery powered. The antenna is fixed and not user changeable.

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
1	Thermo Life Sciences	RDSTXUS1 with RF module MKT6-914.5	EUT	P13	P26RDSTXUS1
2			PT100 probe		

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.

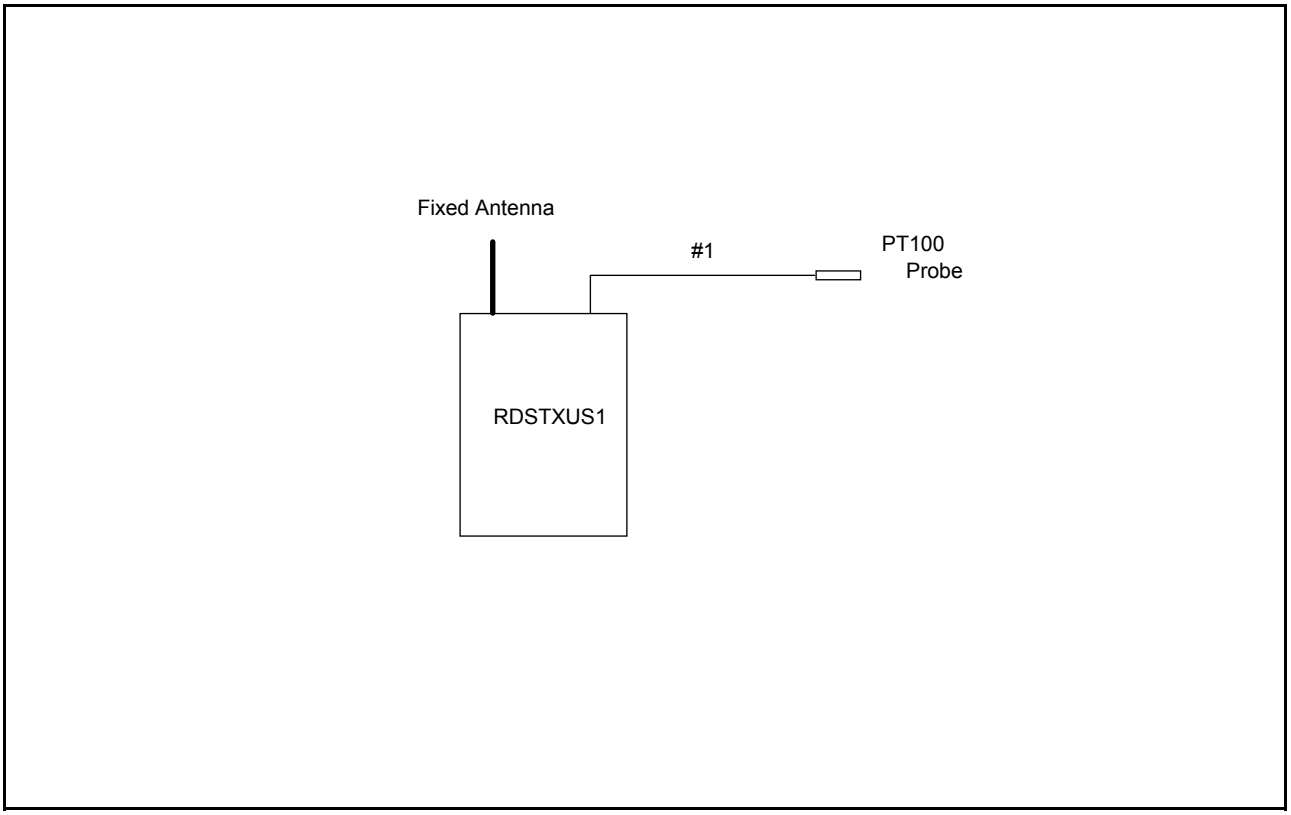
Mod No:	Details
0	Original unit - no modifications were made during the course of testing.

1.3 EUT Operating Modes

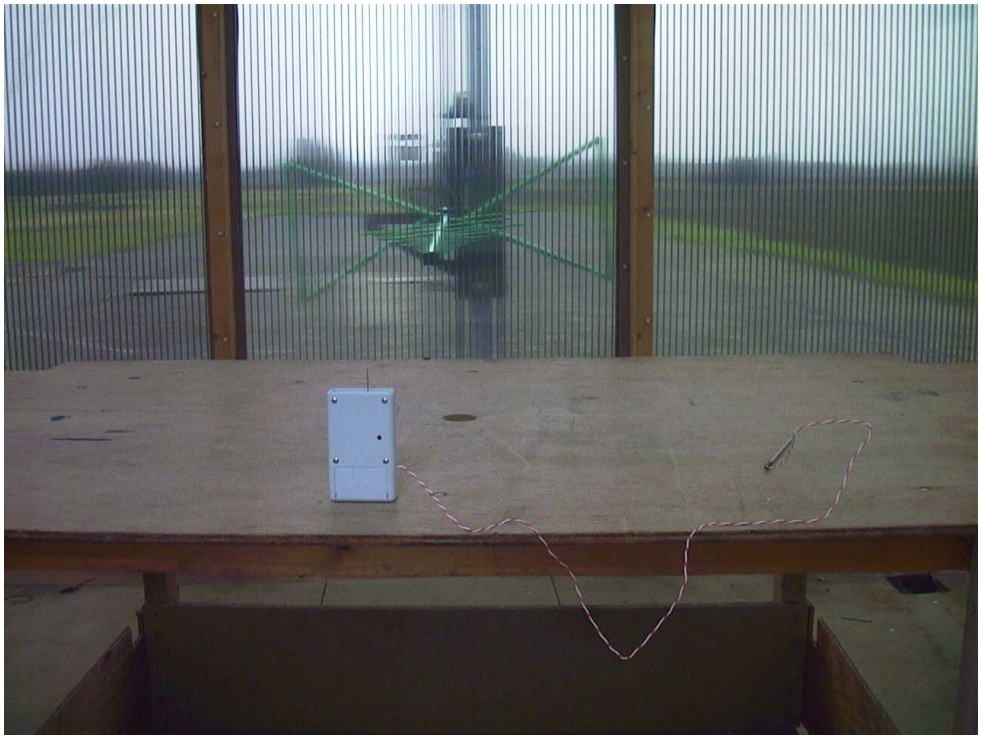
The EUT was tested in the following operating mode or modes. Generally, operating modes are chosen that will exercise the functions of the EUT as fully as possible and in a manner likely to produce maximum emission levels or susceptibility. Individual

Operating Mode	Details
1	Normal transmitting mode.

Figure 1 General Arrangement of EUT and Peripherals



#1 1m unscreened twisted pair temperature probe wire.



Photograph 1 General Arrangement of EUT - Back

Photograph 2 General Arrangement of EUT - Front

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
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
R6	Marconi Instruments	2390	Spectrum Analyser	23901010	9 September 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
A8	EMCO	3115	DR Waveguide Horn (1GHz - 18GHz)	0002-6070	5 November 2002

3 Test Methods

3.1 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.

4.1 Radiated Emissions Results

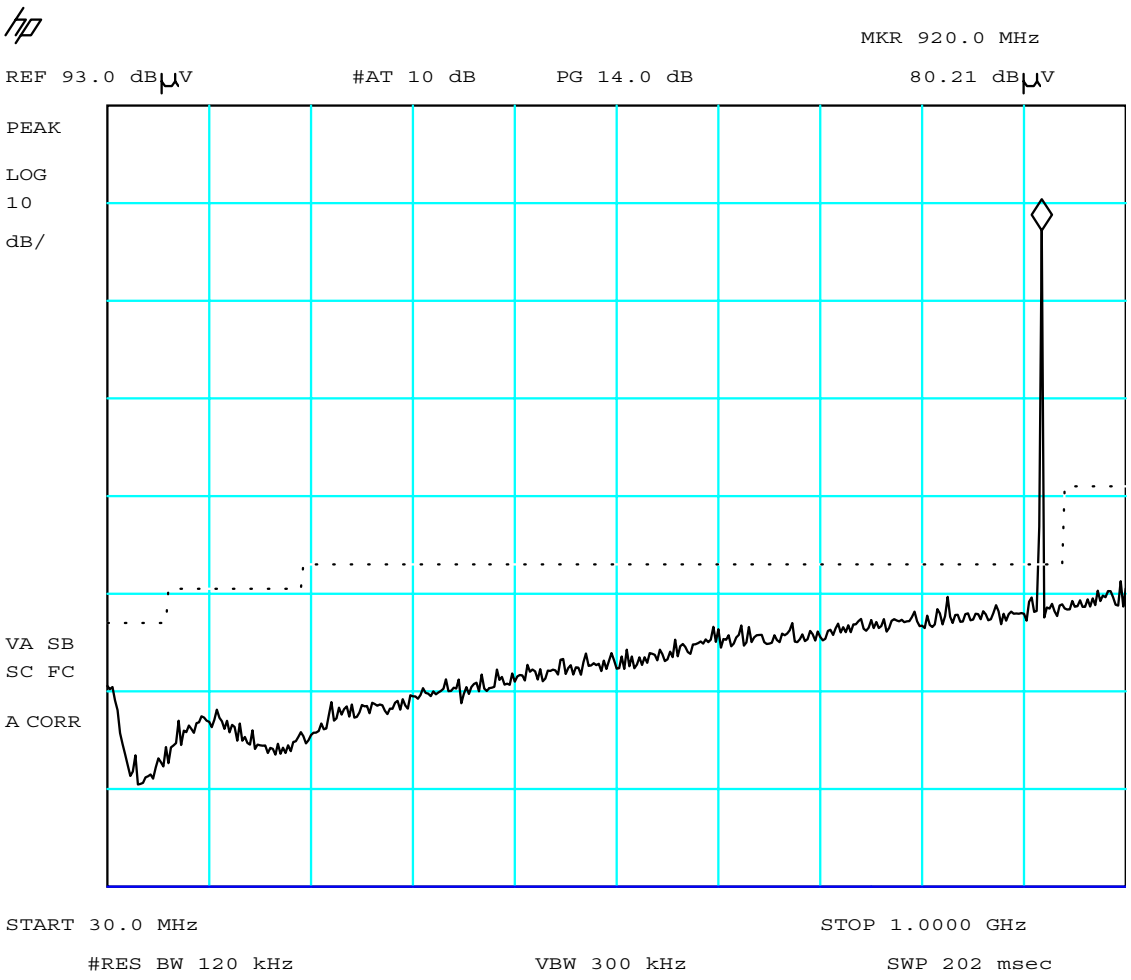
Test Equipment:	Factor Set 1:	HFBILOG	RG214	25 m cable
	Factor Set 2:	DR_GUIDE	MIC_CABLE	3 m cable

Radiated Emissions

Company:	Thermo Life Sciences Ltd.	*Product:*	RDSTXUS1
Date:	16 Nov & 12 Dec 2001	*Test Eng:*	Dave Smith
Ports:			
Test:	ANSI C63.4:1992 using limits of		FCC_C
Ports:			
Test:			

Test	Op Mode	Mod State	Dist m	Fact Set	Freq. MHz	Ant Pol	Rec. Level dBuV	Corr'n Factor dB/m	Total Level dBuV/m	Limit FCC_C dBuV/m	Margin FCC_C dB	Limit	Margin	Notes
	1	0	3	1	914.500	V	64.2	26.7	90.9	94.0	3.1			
	1	0	3	1	914.500	H	55.1	26.7	81.8	94.0	12.2			
	1	0	1	2	1829.080	V	30.4	27.9	58.3	63.5	5.2			#1
	1	0	1	2	1829.080	H	29.5	27.9	57.5	63.5	6.1			#1
	1	0	1	2	2743.630	V	21.6	31.6	53.2	63.5	10.3			#1
	1	0	1	2	2743.630	H	21.0	31.6	52.6	63.5	10.9			#1
	1	0	1	2	3658.160	V	23.1	35.1	58.2	63.5	5.4			#1
	1	0	1	2	3658.160	H	22.1	35.1	57.2	63.5	6.3			#1
	1	0	1	2	4572.700	V	24.8	35.1	59.8	63.5	3.7			#1
	1	0	1	2	4572.700	H	23.1	35.1	58.2	63.5	5.3			#1
	1	0	0.5	2	5487.000	V	21.3	37.4	58.7	69.5	10.9			#1
	1	0	0.5	2	6401.500	V	17.1	38.1	55.2	69.5	14.3			#1
	1	0	0.5	2	7316.000	V	16.4	39.7	56.1	69.5	13.5			#1
	1	0	0.5	2	8230.500	V	17.5	40.6	58.1	69.5	11.5			#1
	1	0	0.5	2	9145.000	V	16.1	41.7	57.8	69.5	11.8			#1
Results							Minimum Margin PASS/FAIL			**3.1** dB **PASS**				

Notes	Comments and Observations
	Results of screened room scans shown in plot 1 to plot 7.
	Limits of section 15.249 were applied.
#1	Measurement of harmonics made at a distance of 1m or 0.5m to improve signal to noise floor ratio. Limits adjusted accordingly. Measurements made with 1MHz bandwith peak detector. The radio signal is pulsed but the "on period" exceed 100msecs and therefore average measurements were not made.



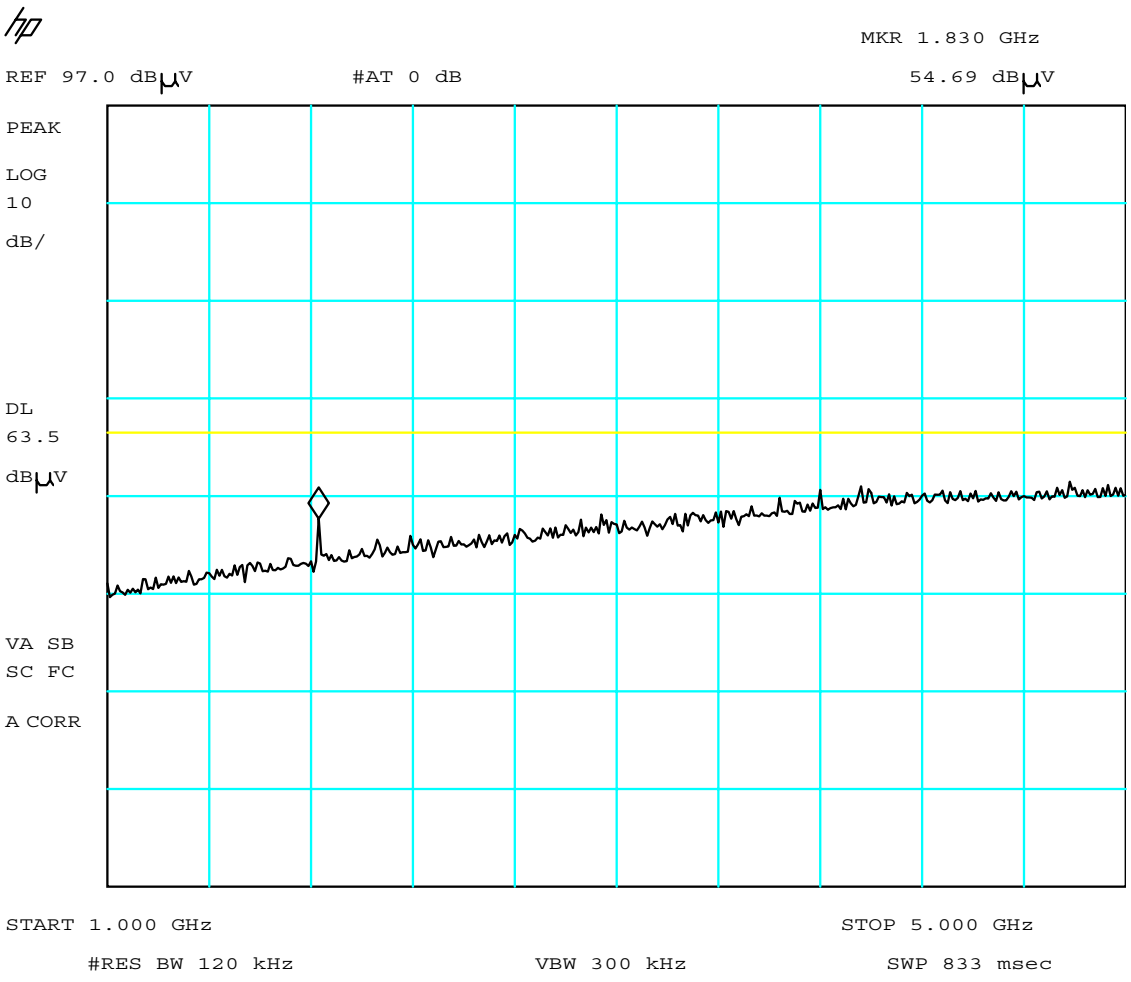
PLOT 1 Radiated Emissions - 30MHz to 1GHz

Company:	Thermo Life Sciences	Product:	RDSTXUS1
Date:	16 Nov 01	Test Engineer:	Dave Smith
Test:	FCC pt 15	Limit:	FCC (B)

Notes:

Polarisation:	V + H	Orientation:	0 - 360°	Operating Mode:	1
Distance:	3m	Antenna:	Bilog	Mod. State:	0
Height:	1m	Filename:	H1B16664.plt		

Frequency List (MHz)



PLOT 2 Radiated Emissions - 1GHz to 5GHz

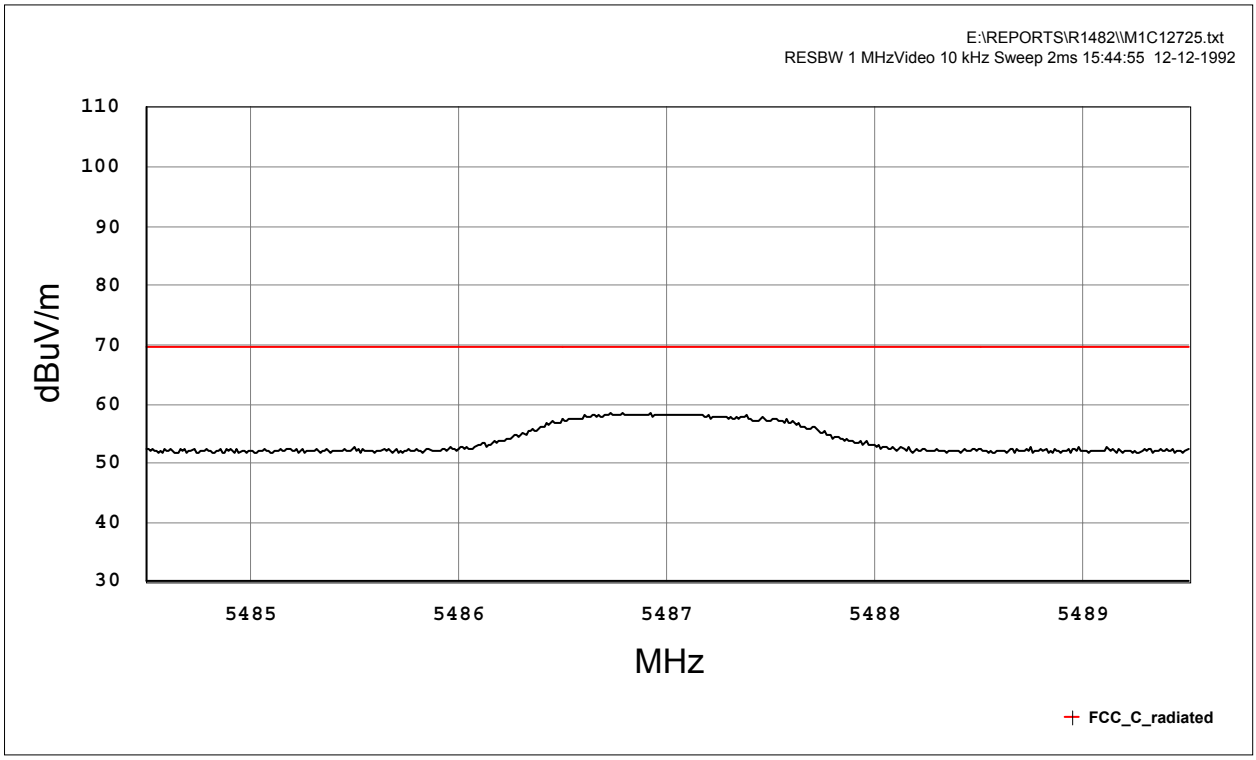
Company:	Thermo Life Sciences	Product:	RDSTXUS1
Date:	16 Nov 01	Test Engineer:	Dave Smith
Test:	FCC pt 15	Limit:	FCC (C) - harmonics

Notes:

Limits adjusted for 1.0m test.

Polarisation:	V + H	Orientation:	0 - 360°	Operating Mode:	1
Distance:	1.0m	Antenna:	DR Guide	Mod. State:	0
Height:	1m	Filename:	H1B16625.plt		

Frequency List (MHz)



PLOT 3 Radiated Emissions - Centered on 6th Harmonic of Transmitter

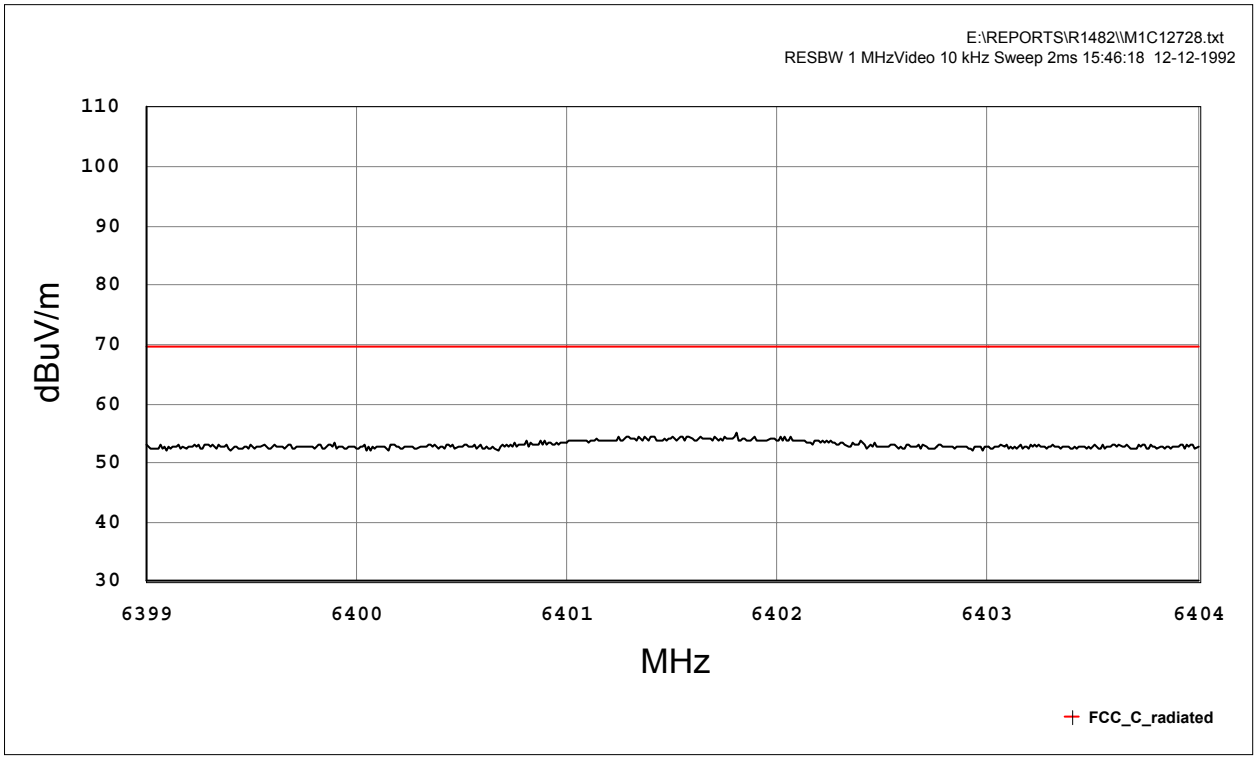
Company:	Thermo Life Sciences	Product:	RDSTXUS1
Date:	12 December 2001	Test Engineer:	Dave Smith
Test:	FCC pt 15	Limit:	FCC (C) - harmonics

Notes:

Limits adjusted for 0.5m test.

Polarisation:	V + H	Orientation:	0 - 360°	Operating Mode:	1
Distance:	0.5m	Antenna:	DR Guide	Mod. State:	0
Height:	1m	Filename:	H1B16625.plt		

Frequency List (MHz)



PLOT 4 Radiated Emissions - Centered on 7th Harmonic of Transmitter

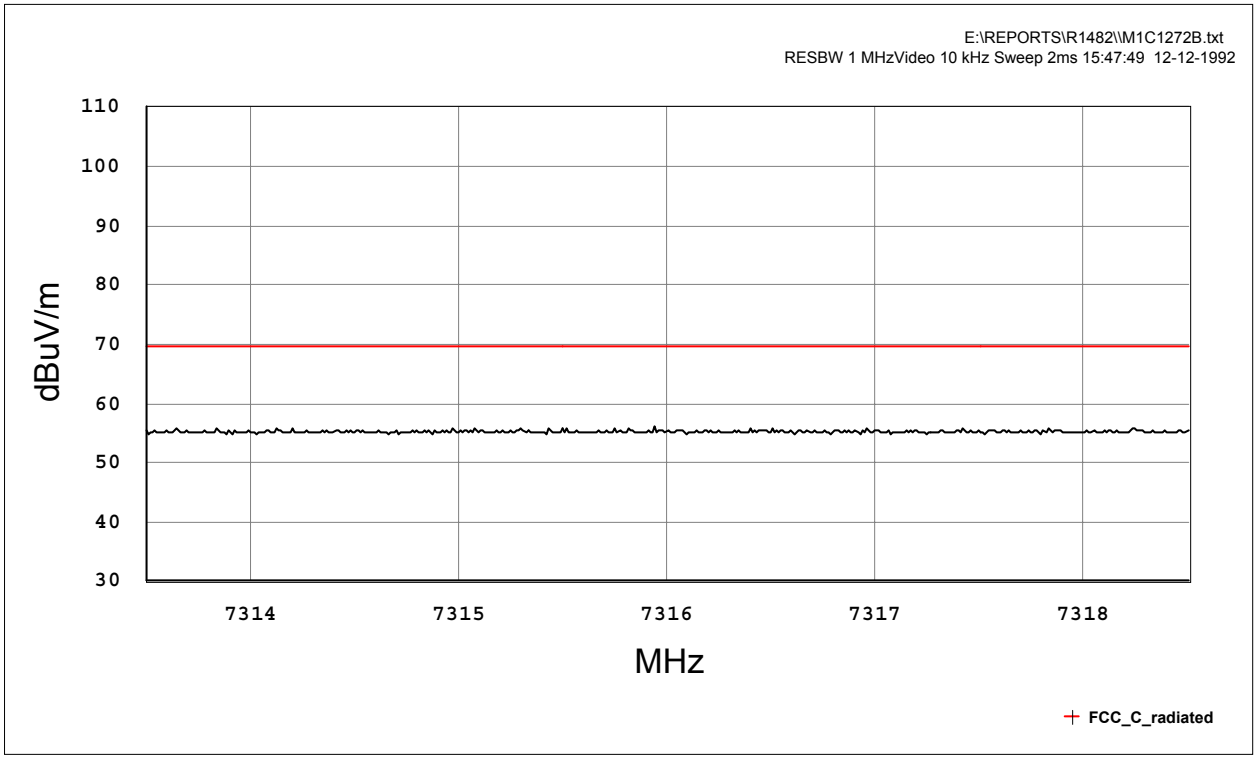
Company:	Thermo Life Sciences	Product:	RDSTXUS1
Date:	12 December 2001	Test Engineer:	Dave Smith
Test:	FCC pt 15	Limit:	FCC (C) - harmonics

Notes:

Limits adjusted for 0.5m test.

Polarisation:	V + H	Orientation:	0 - 360°	Operating Mode:	1
Distance:	0.5m	Antenna:	DR Guide	Mod. State:	0
Height:	1m	Filename:	H1B16625.plt		

Frequency List (MHz)



PLOT 5 Radiated Emissions - Centered on 8th Harmonic of Transmitter

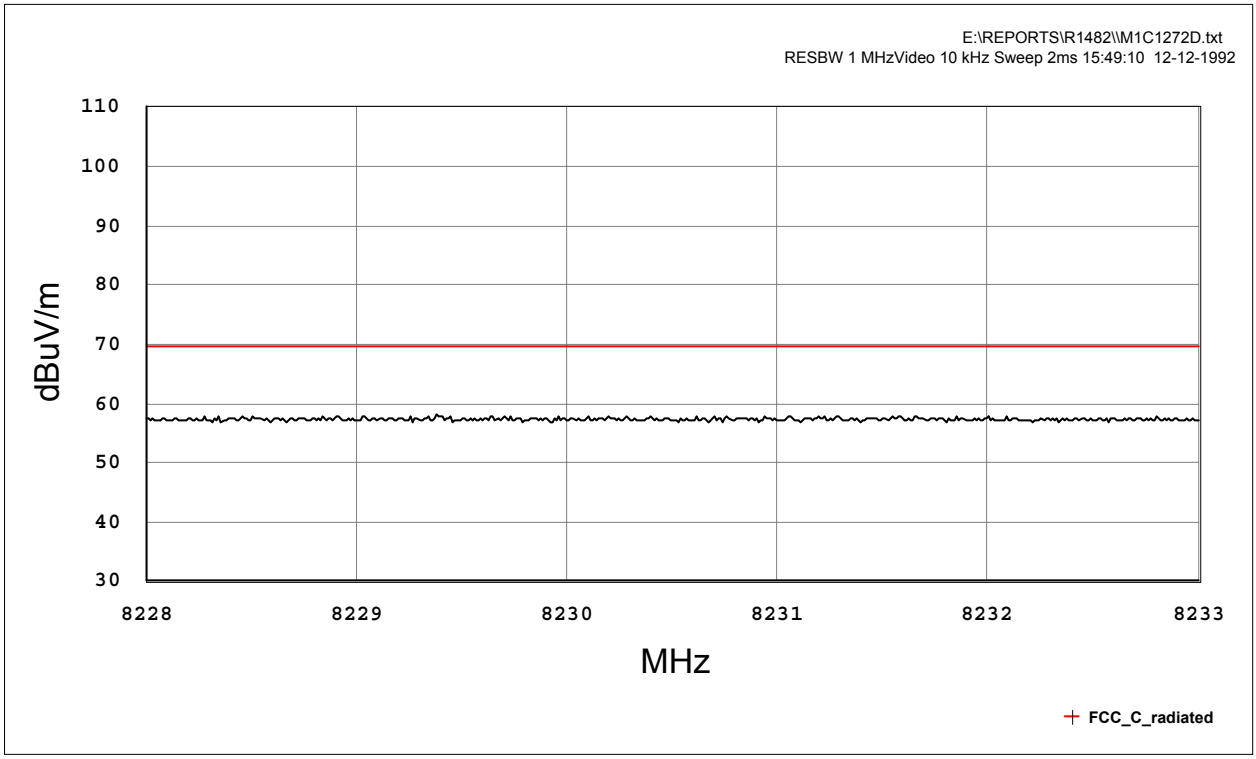
Company:	Thermo Life Sciences	Product:	RDSTXUS1
Date:	12 December 2001	Test Engineer:	Dave Smith
Test:	FCC pt 15	Limit:	FCC (C) - harmonics

Notes:

Limits adjusted for 0.5m test.

Polarisation:	V + H	Orientation:	0 - 360°	Operating Mode:	1
Distance:	0.5m	Antenna:	DR Guide	Mod. State:	0
Height:	1m	Filename:	H1B16625.plt		

Frequency List (MHz)



PLOT 6 Radiated Emissions - Centered on 9th Harmonic of Transmitter

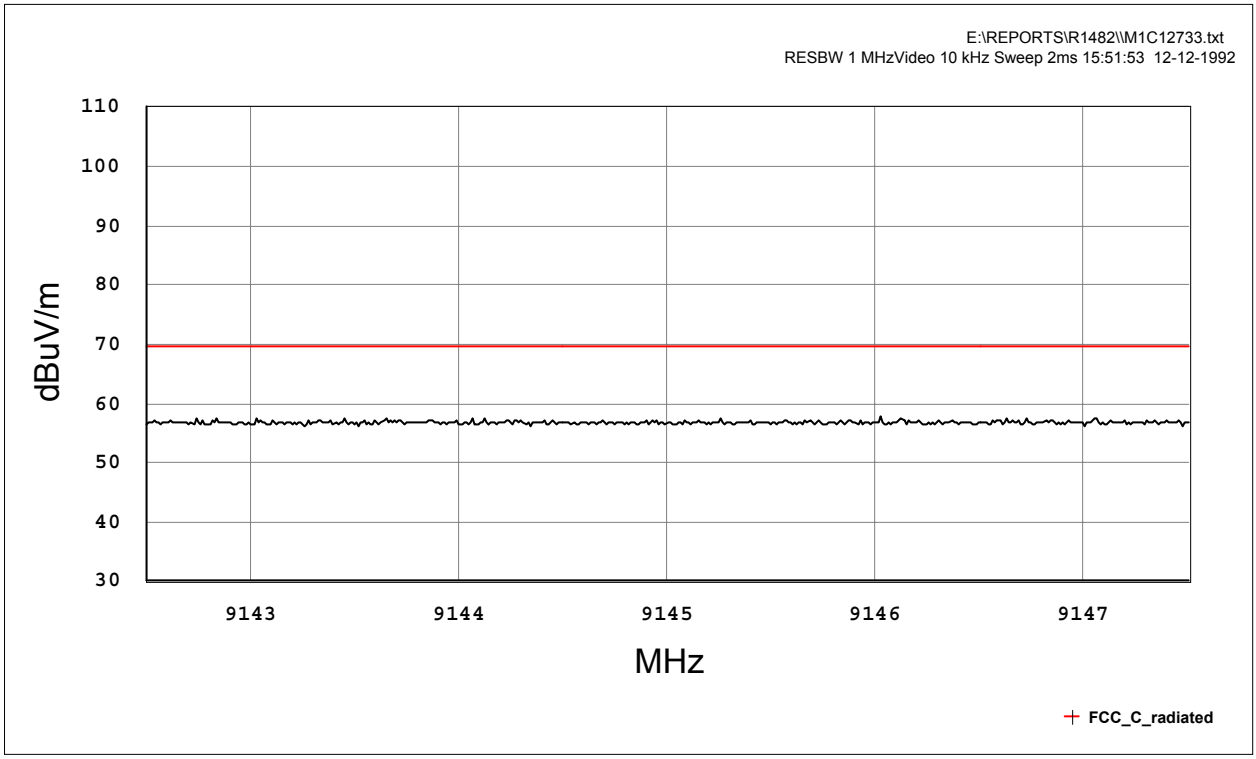
Company:	Thermo Life Sciences	Product:	RDSTXUS1
Date:	12 December 2001	Test Engineer:	Dave Smith
Test:	FCC pt 15	Limit:	FCC (C) - harmonics

Notes:

Limits adjusted for 0.5m test.

Polarisation:	V + H	Orientation:	0 - 360°	Operating Mode:	1
Distance:	0.5m	Antenna:	DR Guide	Mod. State:	0
Height:	1m	Filename:	H1B16625.plt		

Frequency List (MHz)



PLOT 7 Radiated Emissions - Centered on 10th Harmonic of Transmitter

Company:	Thermo Life Sciences	Product:	RDSTXUS1
Date:	12 December 2001	Test Engineer:	Dave Smith
Test:	FCC pt 15	Limit:	FCC (C) - harmonics

Notes:

Limits adjusted for 0.5m test.

Polarisation:	V + H	Orientation:	0 - 360°	Operating Mode:	1
Distance:	0.5m	Antenna:	DR Guide	Mod. State:	0
Height:	1m	Filename:	H1B16625.plt		

Frequency List (MHz)
