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REPORT ON ELECTROMAGNETIC COMPATIBILITY TESTS

Performed at:
TWENTY PENCE TEST SITE

Twenty Pence Road,
Cottenham,
Cambridge
U.K.
CB24 8PS

on

Cambridge Temperature Concepts

DuoFertility Reader

dated

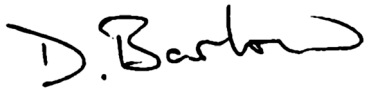
25th May 2011

Document History

Issue	Date	Affected page(s)	Description of modifications	Revised by	Approved by
1	26/05/11		Initial release		

Based on report template:
v071019

Equipment Under Test (EUT):	DuoFertility Reader
Test Commissioned by:	Cambridge Temperature Concepts 23 Cambridge Science Park Milton Road Cambridge CB4 0EY
Representative:	Shamus Husheer
Test Started:	4th May 2011
Test Completed:	5th May 2011
Test Engineer:	Dave Smith
Date of Report:	25th May 2011

Written by:	Dave Smith	Checked by:	Derek Barlow
Signature:		Signature:	
Date:	25th May 2011	Date:	26th May 2011

dB Technology can only report on the specific unit(s) tested at its site. The responsibility for extrapolating this data to a product line lies solely with the manufacturer.

Test Standards Applied

CFR 47 : 2010 Class B	*Code of Federal Regulations: Pt 15 Subpart B- Radio Frequency Devices - Unintentional Radiators*

Emissions Test Results Summary

CFR 47 : 2010 **Part B - Unintentional Radiators** **PASS**

Test	Port	Method	Limit	PASS/FAIL	*Notes*
Conducted Emissions	ac power	ANSI C63.4:2003	CFR47 15.107	PASS	
Radiated Emissions		ANSI C63.4:2003	CFR47 15.109	PASS	

specs_fccv080911

Contents

1 EUT Details

1.1 General

The DuoFertility System is a temperature measuring system. It consists of:

- a battery powered temperature sensor;
- a reader which connects to a PC via a USB link.

The sensor measures and records temperature data over a period of time.

The system can therefore be considered as:

Sensor:

A battery powered class B digital device, and RF receiver operating below 30MHz and a passive tag;

Reader:

An intentional transmitter (120kHz to 150kHz) and a digital device which is a class B peripheral to a PC.

The emissions from the intentional transmitter were all found to be:

- ***more than 40dB below the limits of 15.209;***
- ***operating below 490 kHz;***
- ***not operating a in a restricted band (the band between 110kHz and 495kHz is not restricted);***

and therefore, according to part 15.201a, is subject to Verification rather than Certification

The maximum frequency used or generated by the digital devices was declared as 96MHz and therefore emission measurements were performed up to 1GHz.

This report only includes test data on the Reader which is the subject of this submission for Certification. Data on the items subjet to Verification are detailed in a separate report.

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:	Notes
1	**C.T.C.**	**Duo-fertility Reader**	**USB Reader** (Board Version 11.1)		**#1**
2	Apple	MacBookPro 9Model A1278)	Laptop PC	WQ9319PB66D	FCC DoC
3	Data Electronics	60W MegaSafe (Model ADP-60ACD)	Laptop PSU 16.5V 3.65A		#2
4	D-Link	DES-1005D	Ethernet Switch	B21B44B000635	FCC DoC
5	Outstanding Electronics	AD-071AD	PSU for Switch		#2
6	Microsoft	LifeChat LX-3000	USB Headphone/Mic	79108-523-4799742-11035	FCC DoC

#1 **EUT which is the subject of this application,**
#2 PSU - only Verification required.

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.

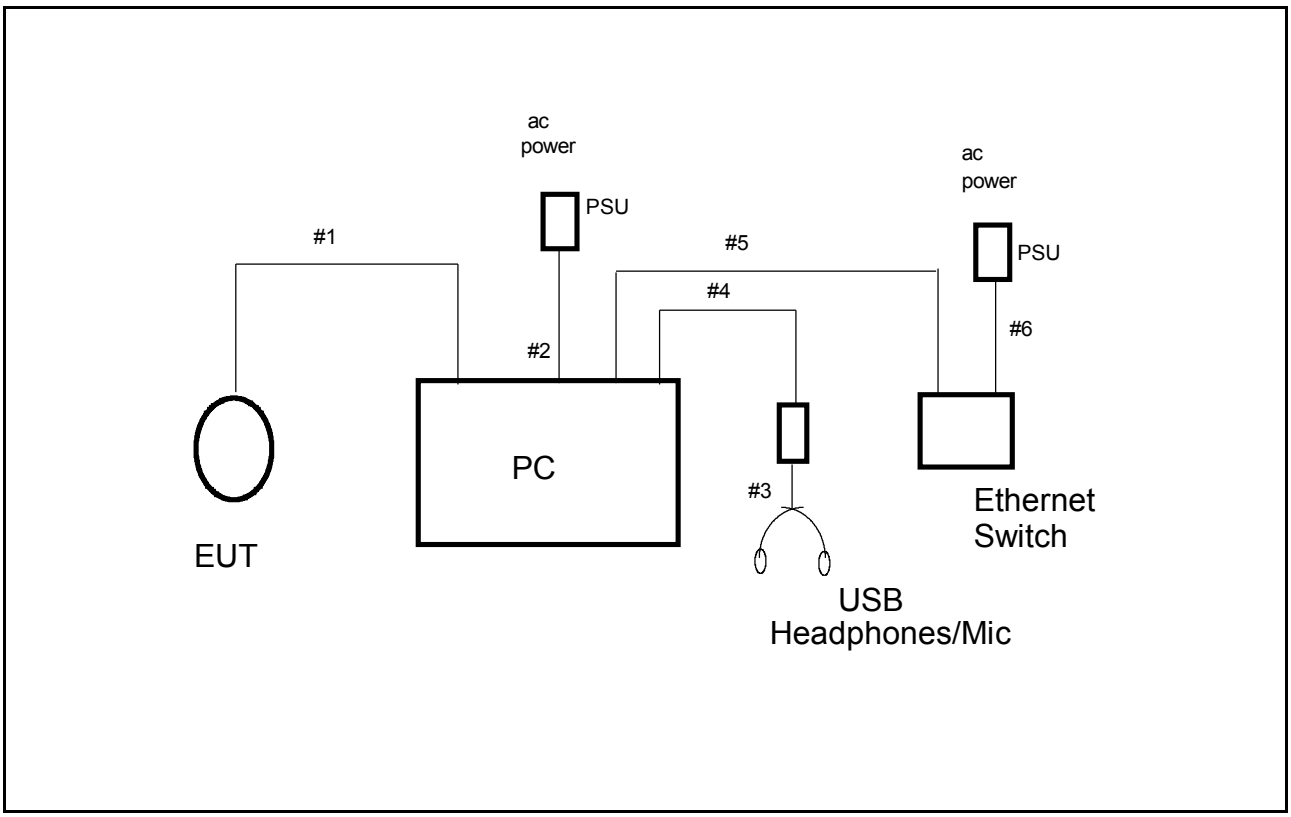
Mod No:	Details	Implemented for
0	As supplied on 4th May 2011.	

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.

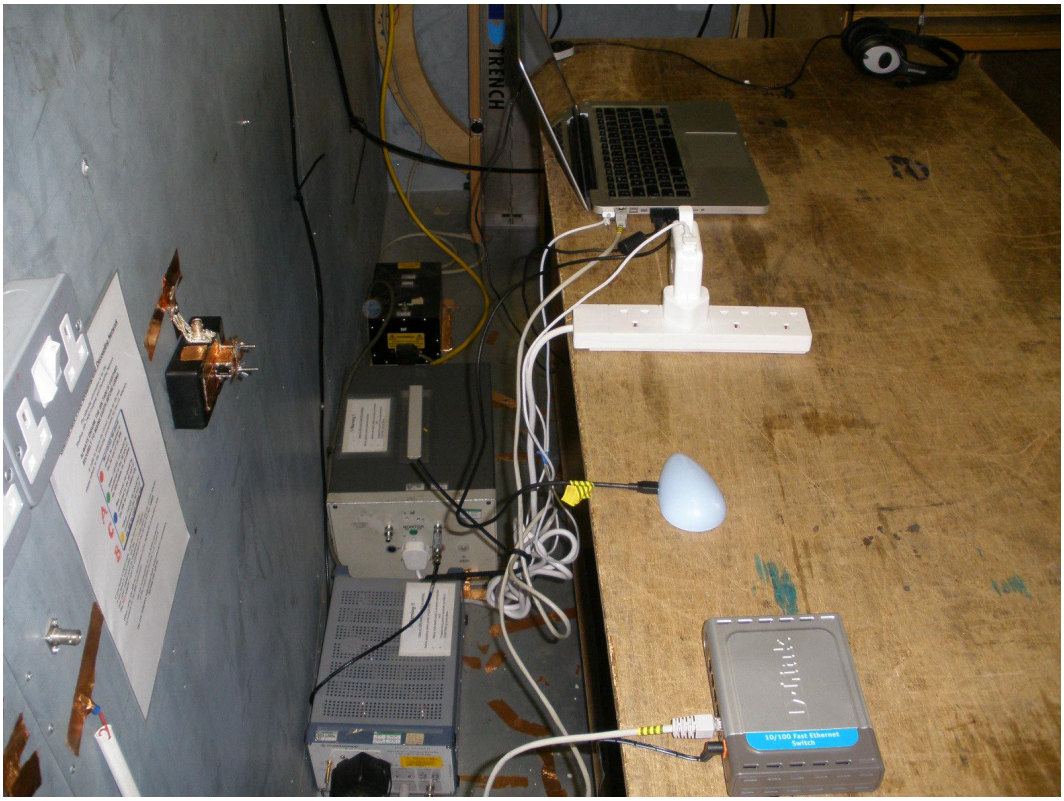
Operating Mode	Details
1	Continually downloading from reader to PC - via USB.

Figure 1 General Arrangement of EUT and Peripherals

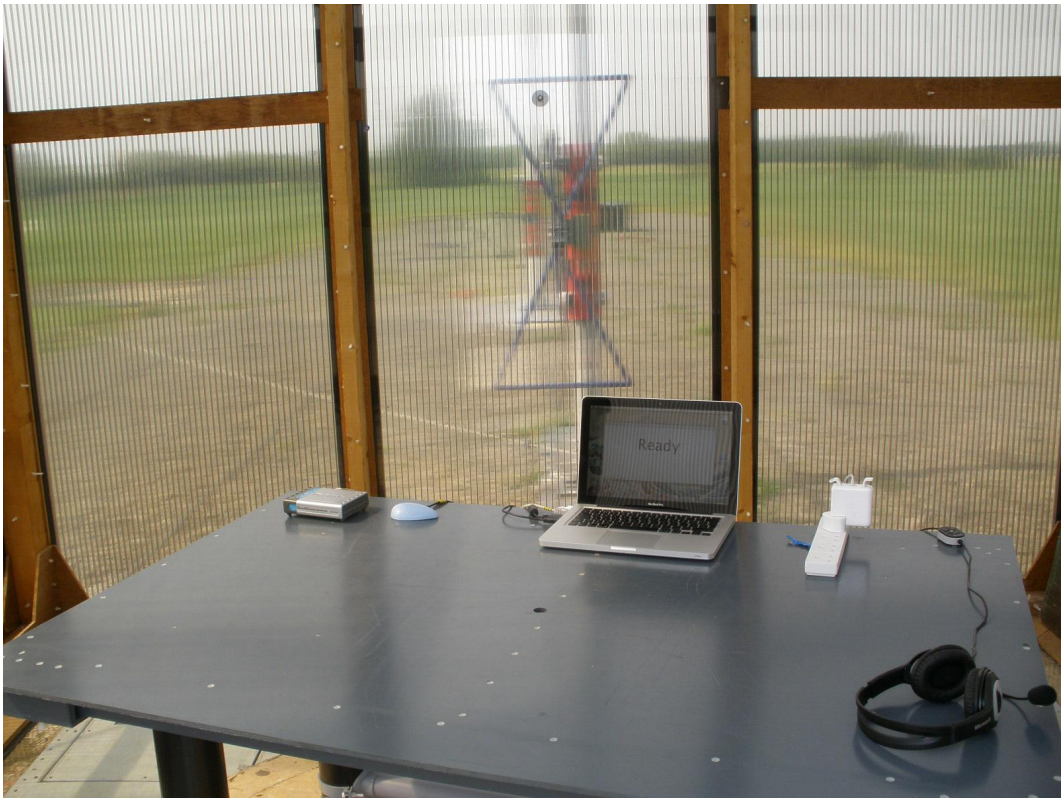


	Description	Type	Length	Notes
#1	USB (to EUT)	Screened	1m	
#2	DC power	Unscreened	1.8m	
#3	Audio Cable	Audio Screen	0.6m	
#4	USB (Headphone Device)	Screened	1.3m	
#5	Ethernet	Screened twisted pair	2m	
#6	DC power	Unscreened	1.8m	

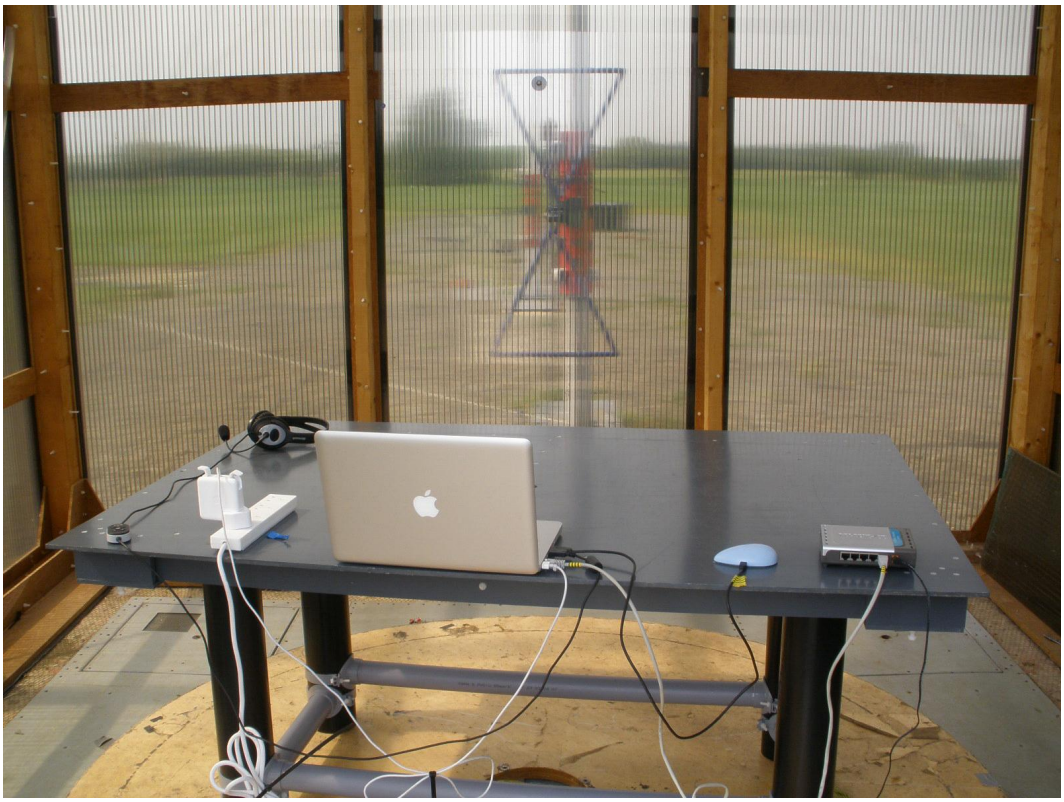
Photograph 1 Conducted Emissions - Front



Photograph 2 Conducted Emissions - Back



Photograph 3 Radiated Emissions - Front



Photograph 4 Radiated Emissions - Back

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:	Details	Serial Number	Calibration Date	Calibration Interval
A12	Chase Bilog CBL6111A	1012	25/01/2011	1 year
L1	EMCO 3825/2 LISN	1358	12/01/11	1 year
L2	R&S ESH3-Z5 LISN	843862/009	12/01/11	1 year
R1	CHASE LHR 7000	1056	07/02/11	1 year
R4	R&S ESVS10	843744/002	19/11/2010	1 year
R9	Agilent E7405A Spectrum Analyser	MY45110758	22/11/10	1 year

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. These LISNs are bonded to the screened room floor.

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°. 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. Attempts are made to find cables positions which produce maximum emissions The results of the scans are shown in the plots included at the end of the report.

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 Conducted Emissions

Tabulated results show levels based on the following calculation:

Conducted Emissions (dBuV) = receiver reading (dBuV) + CF (dB)

CF is the correction factor for the attenuator and cable.

For example:

at 204kHz receiver reading was 33.8dBuV, combined correction factor =10.1 (dB).

Conducted Emissions = 33.8 + 10.1 = 43.9dBuV/m.

For Radiated Emissions

Tabulated results show levels based on the following calculation:

Field Strength (dBuV/m) = receiver reading (dBuV) + CF (1/m)

CF is the correction factor for the antenna and cable.

For example:

at 72MHz receiver reading was 26.8dBuV, combined correction factor =7.1 (1/m).

Total field strength = 26.8 + 7.1 = 33.9dBuV/m.

4 Test Results

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

4.1 Conducted Emissions (Power) - Results

Factor Set 1: L1_11A AB007_CBL040_CBL069_CBL041_09C - -
Factor Set 2: - - - -
Factor Set 3: - - - -
Test Equipment: R1 L1 L2

Conducted Emissions (Power)

Company: Cambridge Temperature Concepts *Product:* DuoFertility Reader
Date: 05/05/11 *Test Eng:* Dave Smith
Ports: ac power
Test: ANSI C63.4:2003 using limits of CFR47 15.107 =CISPR22(B)
Ports:
Test: using limits of

Plot	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 CISPR22(B) dBuV	Margin CISPR22(B) dB	Notes
1	1	0	L	1	0.204	qp	33.8	10.1	43.9	63.4	19.6	
1	1	0	L	1	0.204	av	22.8	10.1	32.9	53.4	20.6	
1	1	0	L	1	0.213	qp	33.8	10.1	43.9	63.1	19.2	
1	1	0	L	1	0.213	av	23.0	10.1	33.1	53.1	20.0	
1	1	0	L	1	0.600	qp	23.8	10.1	33.9	56.0	22.1	
1	1	0	L	1	0.600	av	9.0	10.1	19.1	46.0	26.9	
1	1	0	L	1	5.886	qp	21.3	10.3	31.6	60.0	28.4	
1	1	0	L	1	5.886	av	9.0	10.3	19.3	50.0	30.7	
2	1	0	N	1	0.204	qp	35.0	10.1	45.1	63.4	18.4	
2	1	0	N	1	0.204	av	23.8	10.1	33.9	53.4	19.6	
2	1	0	N	1	0.536	qp	24.0	10.1	34.1	56.0	21.9	
2	1	0	N	1	0.536	av	6.9	10.1	17.0	46.0	29.0	
2	1	0	N	1	0.694	qp	24.4	10.1	34.5	56.0	21.5	
2	1	0	N	1	0.694	av	5.8	10.1	15.9	46.0	30.1	
2	1	0	N	1	2.225	qp	23.0	10.2	33.2	56.0	22.8	
2	1	0	N	1	2.225	av	9.0	10.2	19.2	46.0	26.8	
2	1	0	N	1	5.789	qp	26.4	10.3	36.7	60.0	23.3	
2	1	0	N	1	5.789	av	14.0	10.3	24.3	50.0	25.7	

Results	**Minimum Margin**	**18.4 dB**	
	PASS/FAIL	**PASS**	

Notes	Comments and Observations
	Results of scans shown in plots 1 and 2.

4.2 Radiated Emissions Results

Factor Set 1: A12_FS_10B CBL015_11A - -
Factor Set 2: - - - -
Factor Set 3: - - - -
Test Equipment: R4 A12

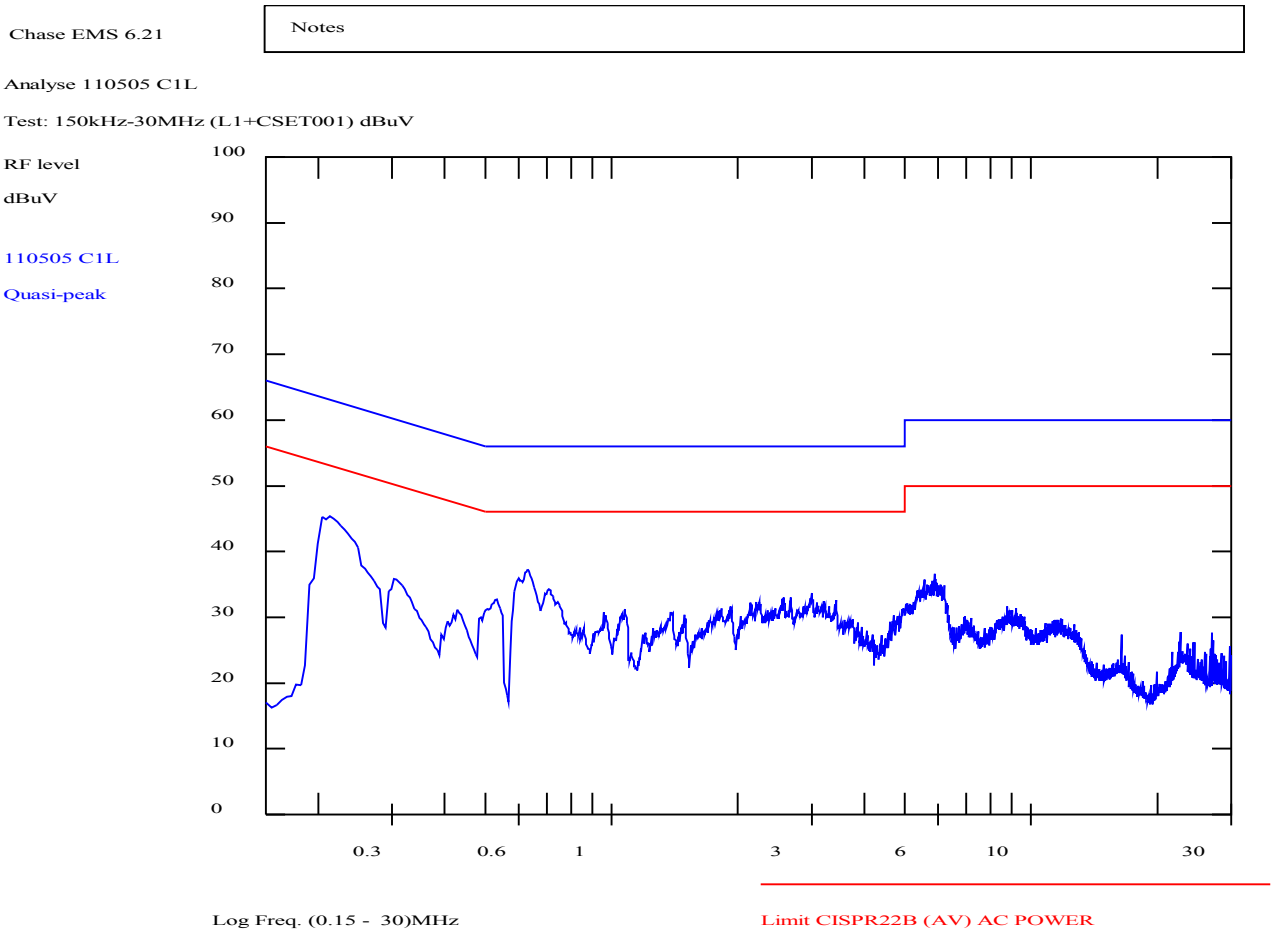
Radiated Emissions

Company: Cambridge Temperature Concepts *Product:* DuoFertility Reader
Date: 04/05/11 *Test Eng:* Dave Smith
Ports:
Test: ANSI C63.4:2003 using limits of CFR47 15.109 =FCC B
Ports:
Test: using limits of

Plot	Op Mode	Mod State	Dist m	Fact Set	Freq. MHz	Ant Pol	Rec. Level dBuV	Corr'n Factor dB/m	Corr'n Factor dB	Total Level dBuV/m	Limit FCC_B dBuV/m	Margin FCC_B dB	Notes
3	1	0	3	1	72.000	V	26.8	7.1		33.9	40.0	6.1	
3	1	0	3	1	72.000	H	29.7	7.1		36.8	40.0	3.2	
3	1	0	3	1	104.800	V	12.5	12.1		24.6	43.5	18.9	
3	1	0	3	1	104.800	H	11.0	12.1		23.1	43.5	20.4	
3	1	0	3	1	115.900	V	11.9	13.2		25.1	43.5	18.4	
3	1	0	3	1	115.900	H	7.5	13.2		20.7	43.5	22.8	
3	1	0	3	1	151.600	V	9.2	12.7		21.9	43.5	21.6	
3	1	0	3	1	151.600	H	8.0	12.7		20.7	43.5	22.8	
3	1	0	3	1	174.000	V	26.8	11.2		38.0	43.5	5.5	
3	1	0	3	1	174.000	H	23.2	11.2		34.4	43.5	9.1	
4	1	0	3	1	282.000	V	2.9	16.1		19.0	46.0	27.0	
4	1	0	3	1	282.000	H	6.8	16.1		22.9	46.0	23.1	

Results	**Minimum Margin**	**3.2 dB**
	PASS/FAIL	**PASS**

Notes	Comments and Observations
	Results of scans shown in plots 3 and 4. Measurements above were made on open area test site using a receiver with a quasi peak detector.



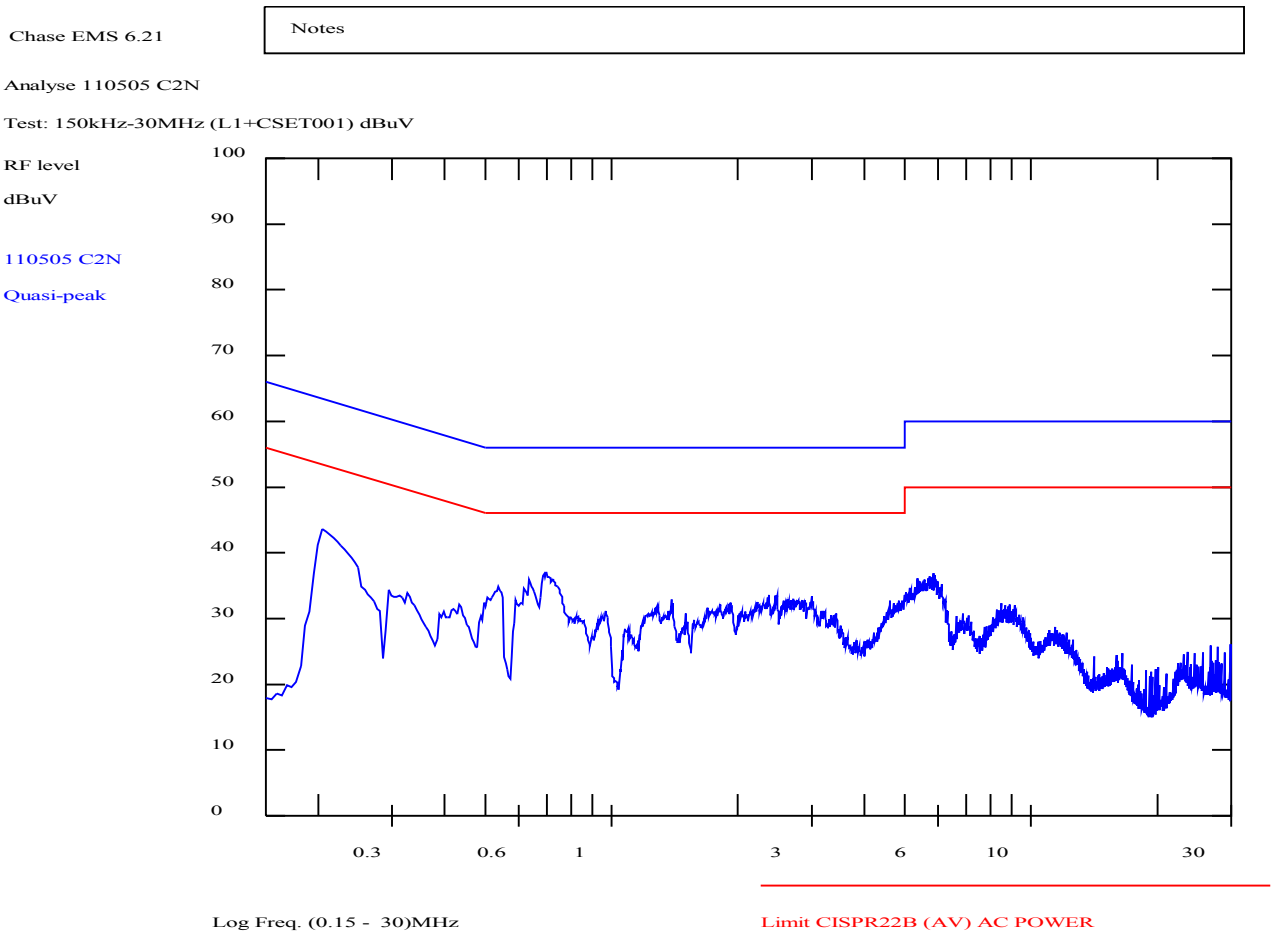
PLOT 1 Conducted Emissions - Live Line of PC

Company:	CTC	Product:	DuoFertility System
Date:	05 May 11	Test Engineer:	Dave Smith
Test:	FCC pt 15	Limit:	FCC (B) QP

Notes:
Live line of PC supply.
Apple + HUB + USB Headphones + EUT
115V
R1, L1, L2

Line:	Live	Attenuator:	10dB PAD	Operating Mode:	1
Detector:	QuasiPeak			Mod. State:	0
LISN:	EMCO	Filename:	C15053FB.plt		

Frequency List (MHz)



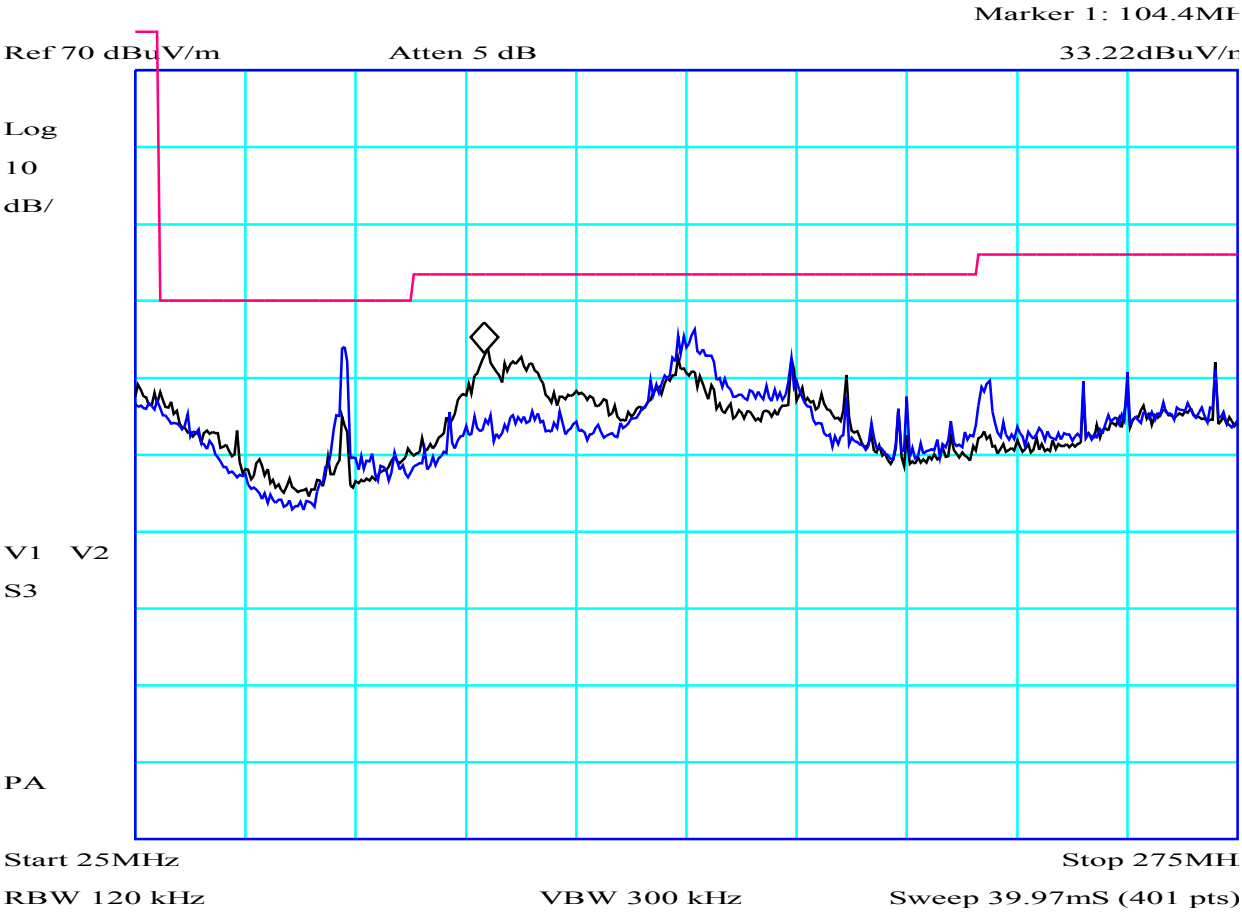
PLOT 2 Conducted Emissions - Neutral Line of PC

Company:	CTC	Product:	DuoFertility System
Date:	05 May 11	Test Engineer:	Dave Smith
Test:	FCC pt 15	Limit:	FCC (B) QP

Notes:
Live line of PC supply.
Apple + HUB + USB Headphones + EUT
115V
R1, L1,L2

Line:	Neutral	Attenuator:	10dB PAD	Operating Mode:	1
Detector:	QuasiPeak			Mod. State:	0
LISN:	EMCO	Filename:	C1505410.plt		

Frequency List (MHz)



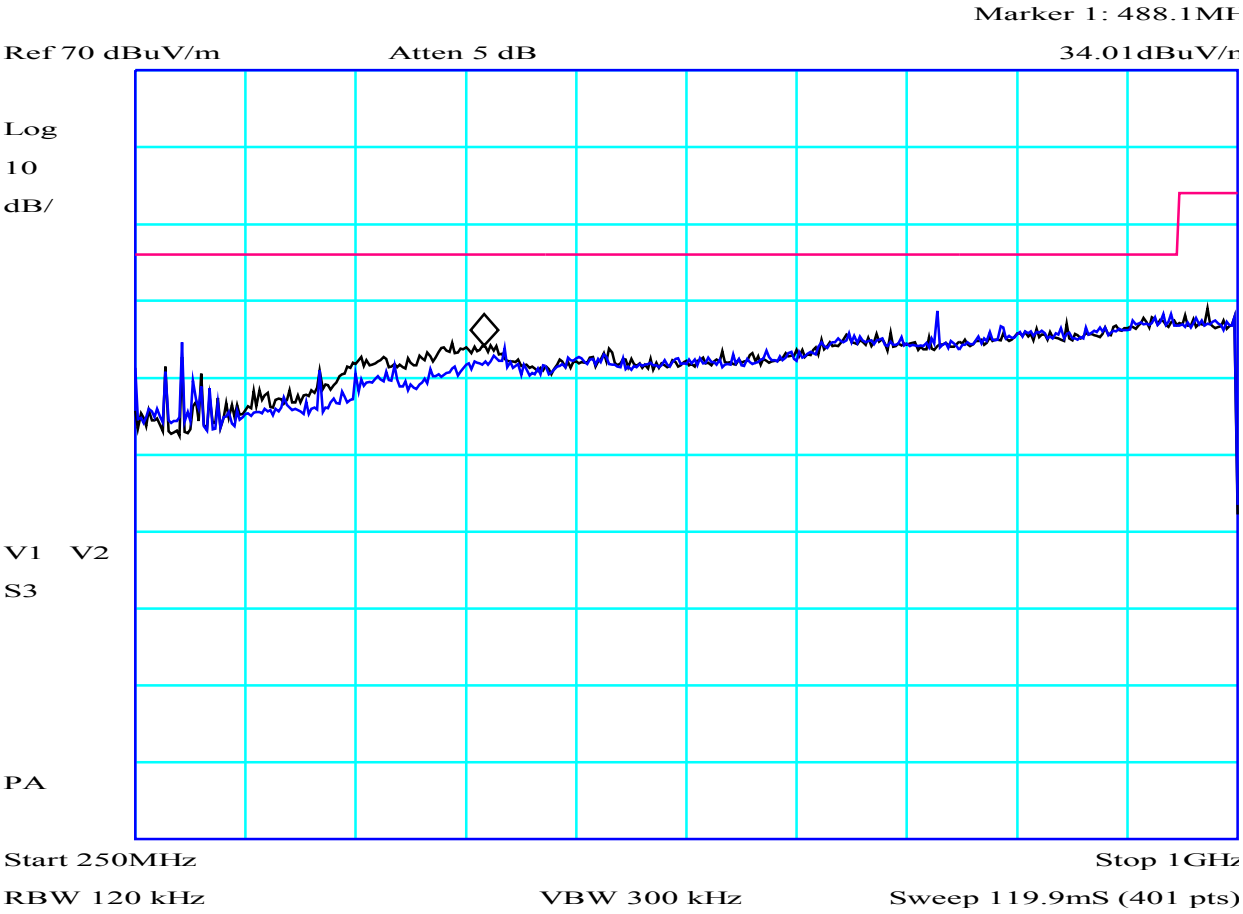
CF1:A12_FS_100806 CF2:CBL002_CBL069_100809

PLOT 3 Radiated Emissions - 25MHz to 275MHz - Downloading from Reader to PC

Company:	Cambridge Temperature	Product:	DuoFertility System
Date:	04/05/2011	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(VIO)	FCC(B)@3m	Limit2:	
Limit3:		Limit4:	

Black: vertical
Blue: horizontal
Apple MacBook + Hub + Microsoft USB Headphones/Microphone + EUT.
Downloading from reader to PC.

Facility:	Anech_1	Height	1m	Mode:	1
Distance	3m	Polarisation	V+H	Modification State:	0
Angle	0-360	File:	H1404666		



CF1:A12_FS_100806 CF2:CBL002_CBL069_100809

PLOT 4 Radiated Emissions - 250MHz to 1GHz - Downloading from Reader to PC

Company:	Cambridge Temperature	Product:	DuoFertility System
Date:	04/05/2011	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(VIO)	FCC(B)@3m	Limit2:	
Limit3:		Limit4:	

Black: vertical
Blue: horizontal
Apple MacBook + Hub + Microsoft USB Headphones/Microphone + EUT.
Downloading from reader to PC.

Facility:	Anech_1	Height	1m	Mode:	1
Distance	3m	Polarisation	V+H	Modification State:	0
Angle	0-360	File:	H140466D		