



Commercial In Confidence

TEST REPORT No: P4290/1

Customer/Applicant: Merrychef Limited
Address: Station Road West
Ash Vale
Aldershot
Hampshire
GU12 5XA

Subject: **ELECTROMAGNETIC COMPATIBILITY**

Customer Ref: 25134

Manufacturer: Merrychef Limited

Product: Microwave Combination Oven

Model/Trade Name: Microwave Assisted Impinger (MAI) - FCC ID : PCV402S2086DK
Microwave Assisted Impinger (MAI) - FCC ID : PCV402S2406DK

Model No/Type: 402S2086DK
402S2406DK

Serial No/Lot No: MAI000003

Tests Carried Out: CFR 47 Part 18 Sections 18.305 & 18.307

This Report applies only to the above referenced EQUIPMENT and details the tests applied using test equipment calibrated to traceable National Standards and is not indicative of the qualities of identical or similar products

Report Author: F Barkas
Title: (EMC Engineer) 

Checked By: O.W.Cockram
Title: (General Manager) 

Signature

Signature

Issue Date:

7 Oct 2005

Tests marked "NUA" in this report are not included in the UKAS accreditation schedule for our laboratory. Opinions and interpretations express herein are outside the scope of UKAS accreditation. This Report is for the exclusive use of the Customer detailed and should not be reported except in full without written authority of EMC Projects Ltd.

EMC Projects Ltd.

Holly Grove Farm, Verwood Road,
Ashley, Ringwood, Hants, BH24 2DB
Tel: 01425 479979 Fax: 01425 480637
E-mail: enquires@emc-projects.co.uk
Website: www.emc-projects.co.uk

EMC Projects is a subsidiary of Cape Engineering UK Ltd. Registered office Rothwell Rd. Warwick CV34 5JX

Commercial In Confidence
Page 1 of 33



Report Summary

Report No: P4290/1

Test Standard: CFR 47 Part 18 Sections 18.305 & 18.307

Carried Out At: EMC Projects Ltd., Ringwood, Hants, BH24 2DB

Equipment Tested: Microwave Assisted Impinger (MAI) - FCC ID : PCV402S2086DK
Microwave Assisted Impinger (MAI) - FCC ID : PCV402S2406DK

Model No: 402S2086DK
402S2406DK

Serial No: MAI000003

Software Version: -

Carried Out On: 8th –13th September 2005

Test Engineer: Mr Frank Barkas

In Attendance: Mr Paul Harrison

SUMMARY of RESULTS

The Table below depicts a summary of the tests and test results detailed in this report.

Test	Test Type	Specification & Issue	Result	Page	Levels/Comments
1	Power Output & Frequency	MPT-5	Pass 1299 Watts	11-13	2.45GHz.+/- 50MHz
2	Conducted Emissions	CFR 47 Part 18 Section 18.307 Non Consumer Equipment Limits	Pass >10dB below the limit	14-19	208V-60Hz Supply
3	Radiated Emissions	CFR 47 Part 18 Section 18.305 ISM greater than 500W Limits	Pass >10dB Avg Detector 3.8 dB Peak Detector below the limit	20-29	1m & 3m Open Area Test Site

CONTENTS

PAGE

Report Summary	2
1. INTRODUCTION	5
2. MODES OF OPERATION	5
3. GENERAL TEST SETUP	5
3.1 Figure 1 - Block Diagram of EUT Set-up	6
3.2 Conducted Emissions (208 V & 240 V System)	6
3.2.1 Figure 1 - General Test Set-up - Table Top Equipment	7
3.3 Radiated Emissions (208V System)	7
3.3.1 Figure 1 - OATS General Test Set-up	8
4. TEST EQUIPMENT	8
5. AMBIENT CONDITIONS	8
6. TEST PROCEDURES	8
6.1 Power Measurement (208V System)	9
6.2 Conducted Emissions (208/240 V System)	9
6.3 Radiated Emissions (208V System)	9
7. TESTS CARRIED OUT	9
8. TEST RESULTS	11
8.1 Test 1 Power Output & Fundamental Frequency (208V System)	11
8.1.1 Test 1a Power Output (208V System)	11
8.1.2 Test 1b Fundamental Frequency (208V System)	11
8.1.3 Test 1 - Test Equipment Used	11
8.1.3.1 Test 1b - Figure 1 - Set-up Photographs	12
8.1.3.2 Test 1b - Figure 2 - 208V Oven – 1.5 GHz-3.5GHz Screened Room Emission Horizontal Measurements Uncorrected Average Detector	13
8.1.3.3 Test 1b - Figure 3 – 208V Oven – 2.4GHz-2.5GHz Screened Room Emission Horizontal Measurements Uncorrected Average Detector	13
8.2 Test 2 - Conducted Emissions 208/240 V – 60 Hz Supply	14
8.2.1 Test 2 - Test Equipment Used	14
8.2.1.1 Test 2 - Figure 1 - Set-up Photographs	15
8.2.1.2 Test 2 – Figure 2 – 208V-60Hz – 10% fan 100% microwave oven - Black Line Quasi Peak Detector	16
8.2.1.3 Test 2 - Figure 3 - 208V-60Hz – 100% fan, 525 deg F Heater - White Line Quasi Peak Detector	17
8.2.1.4 Test 2 - Figure 4 - 208V-60Hz – 10% fan only - Black Line	18
8.2.1.5 Test 2 - Figure 5 - 240V-60Hz – 50% fan, 50% Microwave - Black Line	19
Quasi Peak Detector	19
8.3 Test 3 - Radiated Emissions 30 MHz to 25 GHz (208V Supply)	20
8.3.1 Test 3a - Radiated Emissions 30 MHz to 1 GHz	20
8.3.2 Test 3a - Test Equipment Used	20
8.3.2.1 Test 3a - Figure 1 - Set-up Photographs	21
8.3.2.2 Test 3a - Figure 2 – 208V Oven – 30-230MHz 50% fan only	22
Screened Room Horizontal Emission Uncorrected at 1 metre from EUT	22
8.3.2.3 Test 3a - Figure 3 – 208V Oven – 30-230MHz set fan 525deg F heat setting	22
Screened Room Horizontal Emission Uncorrected at 1 metre from EUT	22
8.3.2.4 Test 3a - Figure 4 – 208V Oven – 30-230MHz 50% fan 50% Microwave	23

Screened Room Vertical Emission Uncorrected at 1 metre from EUT	23
8.3.2.5 Test 3a - Figure 5 – 208V Oven – 30-230MHz 10% fan 100% Microwave	23
Screened Room Horizontal Emission Uncorrected at 1 metre from EUT	23
8.3.2.6 Test 3a - Figure 6 – 208V Oven – 200-1000MHz 10% fan 100% Microwave	24
Screened Room Horizontal Emission Uncorrected at 1 metre from EUT	24
8.3.2.7 Test 3a - Figure 7 – 208V Oven – 200-1000MHz set fan 525 deg F heater on	24
Screened Room Horizontal Emission Uncorrected at 1 metre from EUT	24
8.3.2.8 Test 3a - Figure 8 - Radiated Emissions	25
8.3.2.9 Test 3a - Table 1- Radiated Emissions, Data (Corrected for 10m OATS)	25
8.3.3 Test 3b - Radiated Emissions 1 GHz to 25 GHz	26
8.3.4 Test 3b- Test Equipment Used	26
8.3.5 Test 3b - Figure 1 - Set-up Photographs	27
8.3.5.1 Test 3b - Figure 2-208 V-1.0 -18 GHz 10% Fan 100% Micro	28
Screened Room Uncorrected Peak Detector at 1 m from EUT.	28
8.3.5.2 Test 3b - Figure 3-208 V-18 -25 GHz 50% Fan 50% Micro	28
Screened Room Uncorrected Peak Detector at 1 m from EUT.	28
8.3.5.3 Test 3b - Figure 4 – 208V - Radiated Emissions Corrected	29
8.3.5.4 Test 3b - Table 1- Radiated Emissions, Data	29
9. CONCLUSIONS	29
10. ANNEX A - TEST EQUIPMENT LIST	29
11. ANNEX B - CORRECTION FACTORS	31
11.1 Antenna Correction Factors BA4 30-1000MHz	31
11.2 Antenna Correction Factors DRGFS 1-18GHz	32

1. INTRODUCTION

This report details the results of the Electromagnetic Compatibility (EMC) tests carried out by EMC Projects Ltd as requested by Merrychef Limited. The Microwave Assisted Impinger (MAI) is a Microwave Combination Oven, (EUT) manufactured by Merrychef Limited operating from a 208/240 V ac supply. Testing was carried out to the requirements of CFR 47 Part 18, subpart C, Sections 18.305 Radiated Emissions, and 18.307 Conducted Emissions in accordance with the requirements of FCC/OST MP-5 (1986) and ANSI 63.4 (2003).

EMC Projects Ltd. is an UKAS accredited EMC Test House; a CAB recognised by the EU-US MRA Joint Committee and is registered with the FCC, registration No 90573.

2. MODES OF OPERATION

For the duration of the testing, the EUT was set to one of the following operating modes:

Fan %	Heaters deg F	Microwave %	Power Supply V	Remarks
10	-	-	208	Passed
Pre set	Go to 525	-	208	Passed
50	Set to 350	-	208	Passed
100	Set to 350	-	208	Passed
10	-	100	208/240	Passed
50	-	50	208/240	Passed
50	-	-	208	Passed
Pre set	Go to 525		208	Passed

The EUT load when tested on microwave, consisted of various quantities of tap water in a polypropylene container as required in MP-5.

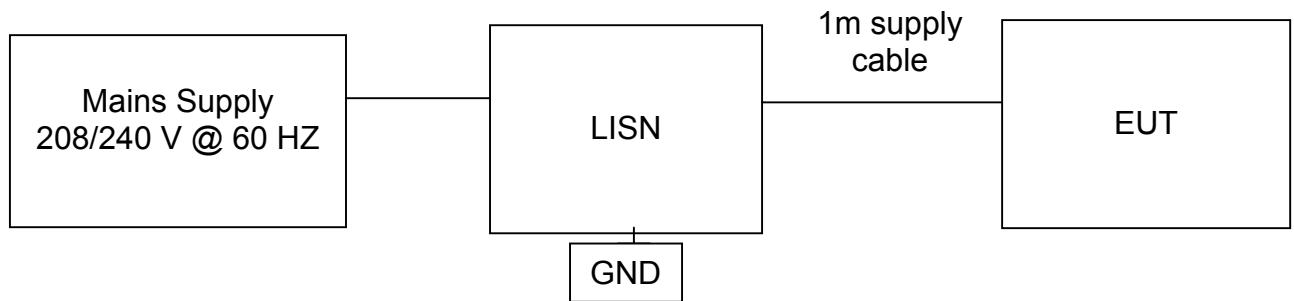
In order to assess if there are any differences between the EUT set to 208 V or 240 V partial testing was carried out on the EUT set to 240 V as well as full tests to the EUT set to 208 V. In order to change the operating voltage of the EUT different terminals were used on the input transformer this results in the circuits after the transformer being the same on both for both input volts. The heating elements are passive; testing with the different heaters was not carried out.

3. GENERAL TEST SETUP

The EUT was set-up for testing as described below and shown in the set-up diagrams and photographs. A block diagram of the EUT set-up is shown in figure 1 detailing cable connections. A dummy load of tap water was placed in the centre or front right of the oven as required. Worse test condition, were assessed for each test required. The only cable connected to the EUT was the mains cable.

The method used to calculate the amount of tap water to be used as a dummy load and the type of container, was as detailed in MP-5 Para 4.1.

3.1 Figure 1 - Block Diagram of EUT Set-up



3.2 Conducted Emissions (208 V & 240 V System)

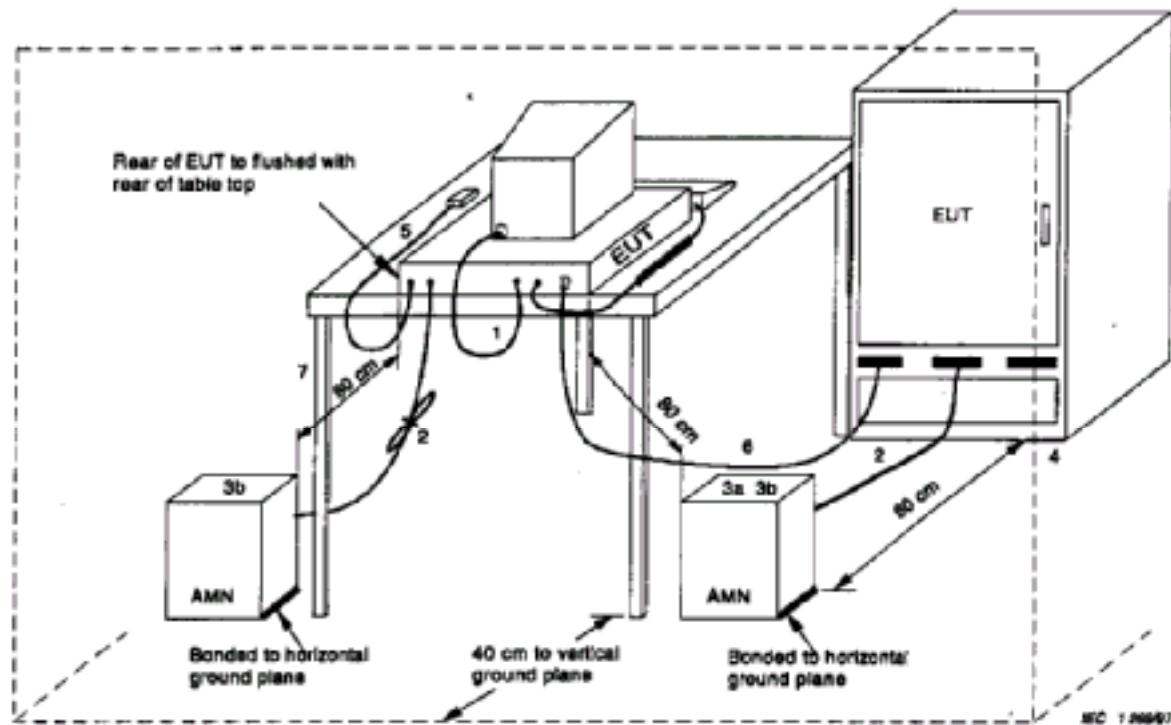
The EUT being Table Top Equipment was set-up upon a non-metallic table measuring 800mm x 800mm, 800mm above the conducting ground plane and at least 400mm from the vertical conducting surface in Screened Room No 1, as indicated in the test set-up and set-up photographs.

The EUT was powered from a filtered 208/240 V - 60 Hz supply via Line Impedance Stabilizing Networks (LISN's). The LISN was mounted and bonded to the conducting ground plane 800mm from the EUT. All unused 50-Ohm connectors of the LISN were terminated with resistive 50-Ohm terminations.

If necessary any excess length of the EUT's supply and interconnecting cables were folded back and forth at the centre of the cable to produce a bundle 40cm in length to ensure the overall length did not exceed 1m.

The EUT ground (safety) connection was connected to the ground at the LISN, through the conductor provided in the supply lead.

3.2.1 Figure 1 - General Test Set-up - Table Top Equipment



AMN = artificial mains network (LISN)

EUT = equipment under test

- 1) If cables which hang closer than 40cm to the horizontal metal ground plane cannot be shortened to appropriate length, the excess shall be folded back and forth forming a bundle 30cm – 40cm long.
- 2) Excess mains cord shall be bundled in the centre or shortened to the appropriate length.
- 3) EUT connected to one AMN. The AMN maybe connected alternatively to the vertical reference plain.
 - 3a) All other equipment powered from one or more additional AMNs
 - 3b) AMN 80 cm from EUT and at least 80 cm from other units and ether metal planes
- 4) EUT and cables shall be insulated from horizontal metal ground plane.
- 5) Cables of hand operated devices, such as keyboards, mouses etc. shall be placed as for normal use.
- 6) I/O cable to floor-standing unit drapes to ground plane and excess is bonded. Cables not reaching ground plane are dropped to height of connector or 40cm whichever is lower.
- 7) Mains and signal cables shall be draped to the floor. No extension cords shall be used to the mains receptacle.

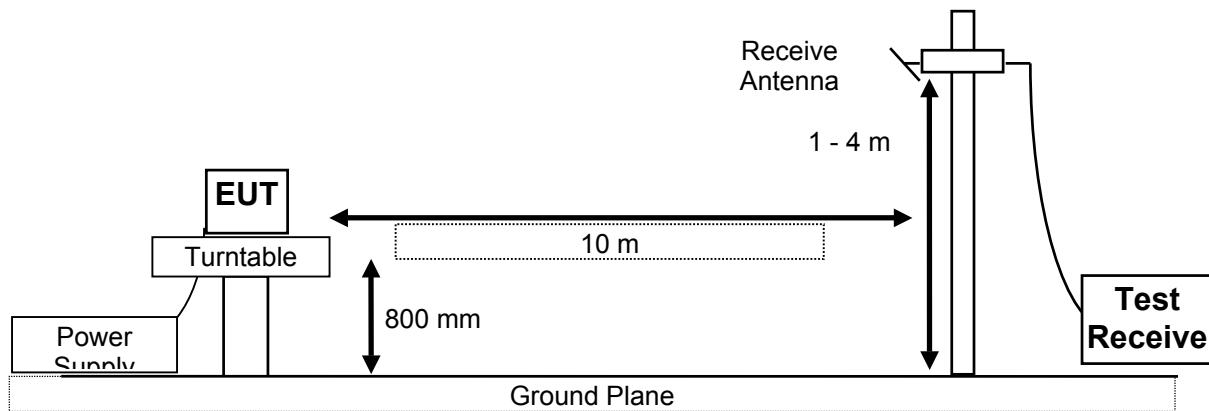
3.3 Radiated Emissions (208V System)

Measurements for radiated emissions were carried out on a 3 m Open Area Test Site (OATS) meeting the requirements of 5.3 of ANSI 63.4:1992.

For preliminary testing radiated emissions were first recorded in an unlined screened room to determine the mode of operation, cable, sub-assembly position, and layout that produced the maximum levels and frequencies of any emissions.

The EUT was then moved to the OATS and placed on a Turntable 800mm above the conducting ground plane; the layout was that, previously assessed in the screened room as producing the maximum emissions. This is indicated in the test set-up and set-up photographs.

3.3.1 Figure 1 - OATS General Test Set-up



4. TEST EQUIPMENT

All test equipment used for the tests was calibrated and its operation verified prior to being used, a full list of which is shown in Annex A.

Test cable measured attenuation figures and calibrated antenna factors not detailed in other areas of the report are listed in Annex B.

5. AMBIENT CONDITIONS

For the duration of the tests the ambient conditions were recorded and found to fall in the following ranges:

	208V System	240 V System
Temperature Recorded:	22-25 °C	22 °C
Humidity Recorded:	50-56 %	53 %
Atmospheric Pressure:	1020-1024 mb	1022 mb

6. TEST PROCEDURES

Procedures and methods of test employed were in accordance with the requirements of the specifications applied, using accredited in-house test procedures in accordance with ANSI 63.4:2003 as described below:

6.1 Power Measurement (208V System)

The EUT shall be set to 100% of full power. A dummy load of tap water, in the style of container and positioned, as required by MP-5 Para 4.1 shall be placed in the microwave oven. The temperature rise of the water over a period of 3 minutes shall be recorded this test is to be repeated a minimum of 3 times. This temperature rise shall be used to calculate the power output of the microwave. The average calculated power will be used to determine the radiated limits to be applied.

6.2 Conducted Emissions (208/240 V System)

The EUT shall be set-up in the screened room as detailed in Para 3, conducted emissions will be recorded on each supply line over the frequency range 150 kHz to 30 MHz with a receiver bandwidth of 10/9 kHz. The receiver shall be in Peak, Quasi-Peak and Average detector modes as required to ensure compliance with the specification, whilst operating the EUT in the worse state condition.

The EUT dummy load shall be maintained at the level of tap water, using the style of container and positioned in the oven, as required by MP-5 Para 4.1.

The recorded emissions shall be compared against the limits for CFR 47 Part 18.307 non-consumer equipment.

6.3 Radiated Emissions (208V System)

With the EUT set-up in the screened room as for conducted emissions and operated at maximum power output and differing loads of tap water, frequencies of radiated emissions shall be recorded from the EUT at a distance of 1 m in both polarities.

The EUT dummy load's shall be maintained during all testing, at the level of tap water, using the style of container and positioned in the oven, as required by MP-5 Para 4.1.

The EUT will then be taken onto the OATS and the maximum levels of the radiated emissions recorded in preliminary tests will be measured at distances of either 10 or 3 m, with the receive antenna varied between 1 and 4 m in height, the antenna in both vertical and horizontal polarisation and the EUT rotated through 360deg.

The recorded emissions shall be compared against the limits for CFR 47 Part 18.305 non-consumer equipment.

7. TESTS CARRIED OUT

The following tests were deemed to be applicable to the EUT and were carried out as detailed in the test results section.

Test	Test Type	Specification & Issue	Levels Comments
1	Power Output & Frequency	MPT-5: 1986	In line with the declared power output & a fundamental frequency of 2.45GHz +/-50MHz 208V-60Hz Supply
2	Conducted Emissions	CFR 47 Part 18 Section 18.307	208V-60Hz Supply 240V-60Hz Supply
3	Radiated Emissions	CFR 47 Part 18 Section 18.305	3m Open Area Test Site 208V-60Hz Supply

8. TEST RESULTS

8.1 Test 1 Power Output & Fundamental Frequency (208V System)

8.1.1 Test 1a Power Output (208V System)

The EUT was set-up as shown in figure 1, the microwave set to 100% of full power and a dummy load consisting of 1500 milli-litres of tap water contained in a polypropylene beaker was positioned in the centre of the microwave oven; the average temperature rise of the water over 5 periods of 3 minutes was recorded. This temperature rise was used to calculate the power output of the microwave.

The ac-measured current during this test was found to be inline with the manufacturers declared level for the microwave operating at 100% of full power.

In order to calculate the power output the following formula was used:

$$P = \frac{q \times \Delta t}{14.4 \times T} \text{ watts}$$

P = watts	Δt = temperature rise in water (Deg C) 37.42
q = quantity of water(cm^3) 1500 milli-litres	T = heating time (min) 3

P = 1299 Watts without an allowance for the container

8.1.2 Test 1b Fundamental Frequency (208V System)

The 208V EUT was set-up as shown in figure 1, the microwave was set to 100% of full power and a dummy load consisting of 1300 milli-litres of tap water contained in a polypropylene beaker was positioned in the centre of the microwave oven. The fundamental frequency was recorded and found to remain within the ISM band of 2.45GHz +/- 5MHz.

8.1.3 Test 1 - Test Equipment Used

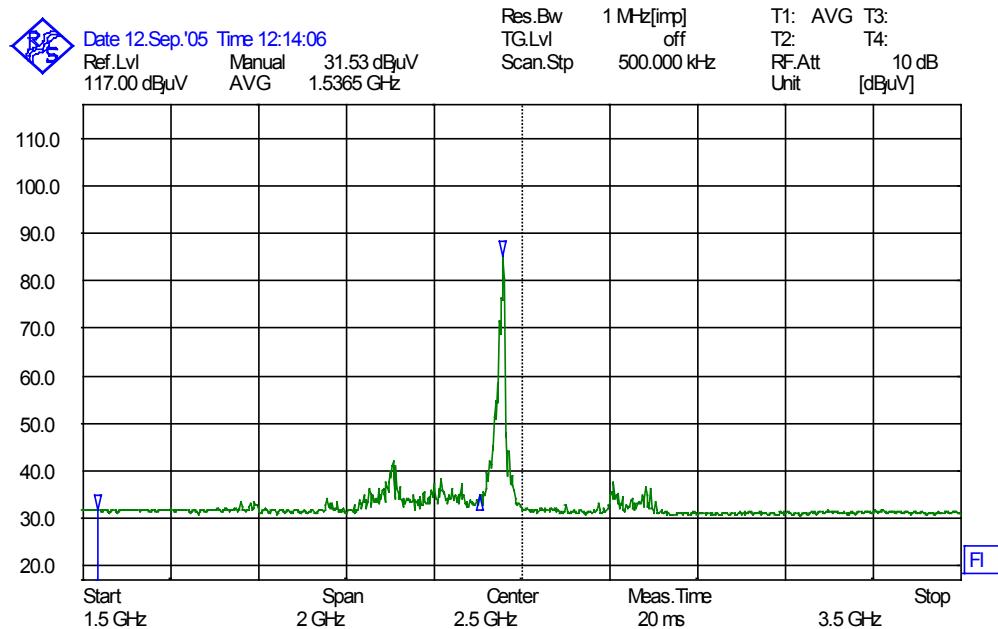
The following major items of test equipment were used for the power output & fundamental frequency tests:

DRGFS	RX12	RX14	PA5	YI5	OATS2
-------	------	------	-----	-----	-------

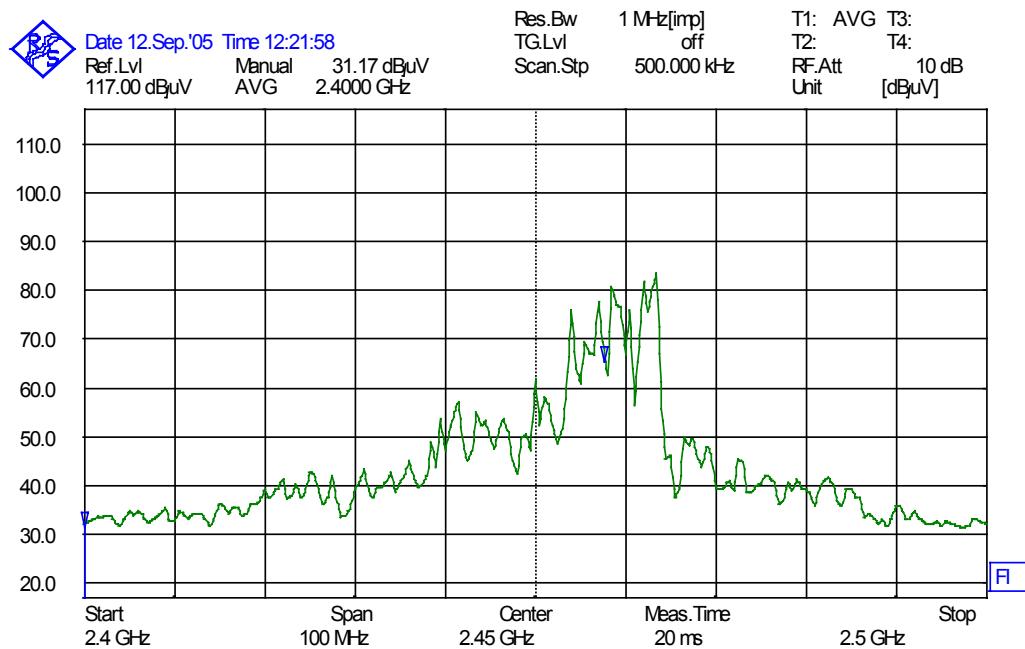
8.1.3.1 Test 1b - Figure 1 - Set-up Photographs



8.1.3.2 Test 1b - Figure 2 – 208V Oven – 1.5 GHz-3.5GHz Screened Room Emission Horizontal Measurements Uncorrected Average Detector



8.1.3.3 Test 1b - Figure 3 – 208V Oven – 2.4GHz-2.5GHz Screened Room Emission Horizontal Measurements Uncorrected Average Detector



8.2 Test 2 - Conducted Emissions 208/240 V – 60 Hz Supply

The EUT was set-up inside a screened room as detailed below and powered from a filtered 208/240 V – 60 Hz supply via Line Impedance Stabilization Units (LISN's). The format for the layout was as detailed in Para. 3, set-up diagrams with the actual layout as the photograph in figure 1.

The Test Equipment was verified for calibration and operation before being used.

Prior to carrying out the tests ambient levels were recorded and found to be greater than 6 dB below the required limits.

During the test, the EUT was powered up in the required combination of heater fan and microwave. A dummy load of 1050 milli-litres of tap water in a polypropylene container was placed in the centre of the EUT when the microwave tests were carried out.

Conducted emissions were recorded on both Live and Neutral supply lines over the frequency range 150 kHz to 30 MHz in accordance with the specification requirements.

Emissions were recorded with the EUT operating as detailed in 2 modes of operation. The results depicted in figures 2 - 4 are representative worse case graphs.

Figures 2-4 are representative graphs of the levels of conducted emissions recorded. These and other measurements taken showed that the maximum-recorded emissions in the previously detailed modes of operation were within the required limits.

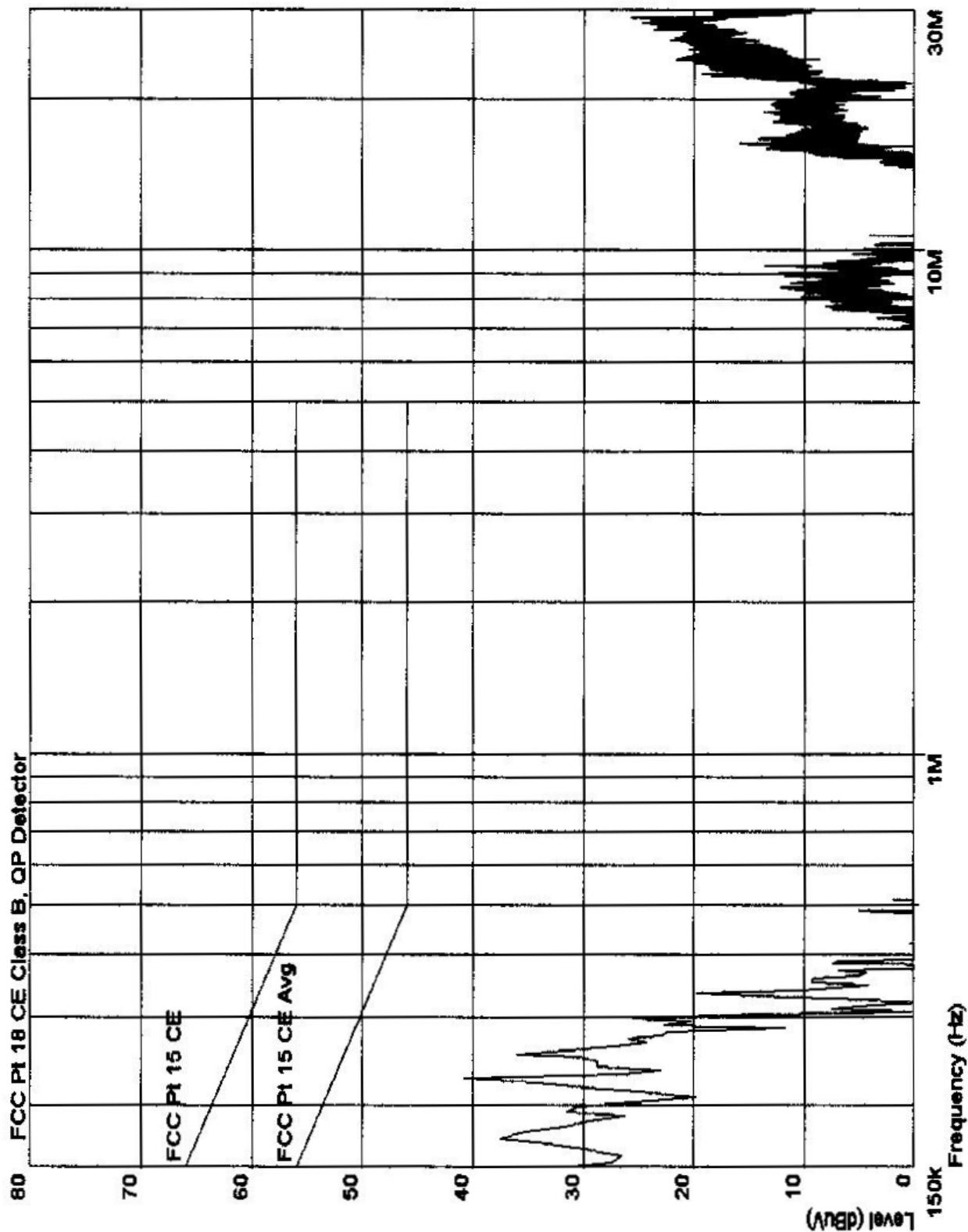
8.2.1 Test 2 - Test Equipment Used

The following major items of test equipment were used for the conducted emission tests:

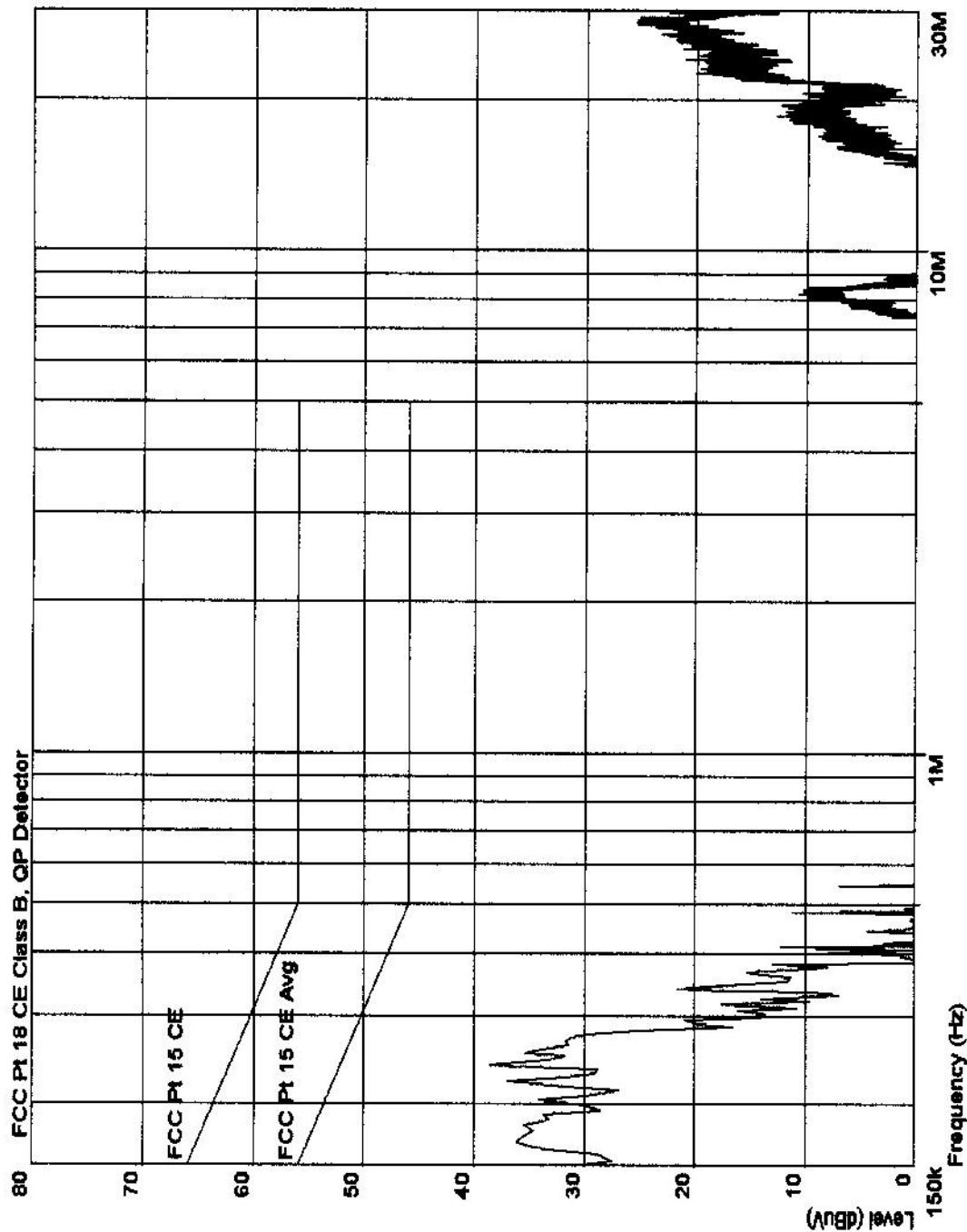
LHR	L1/1	L1/2	L1/3	Room 1
-----	------	------	------	--------

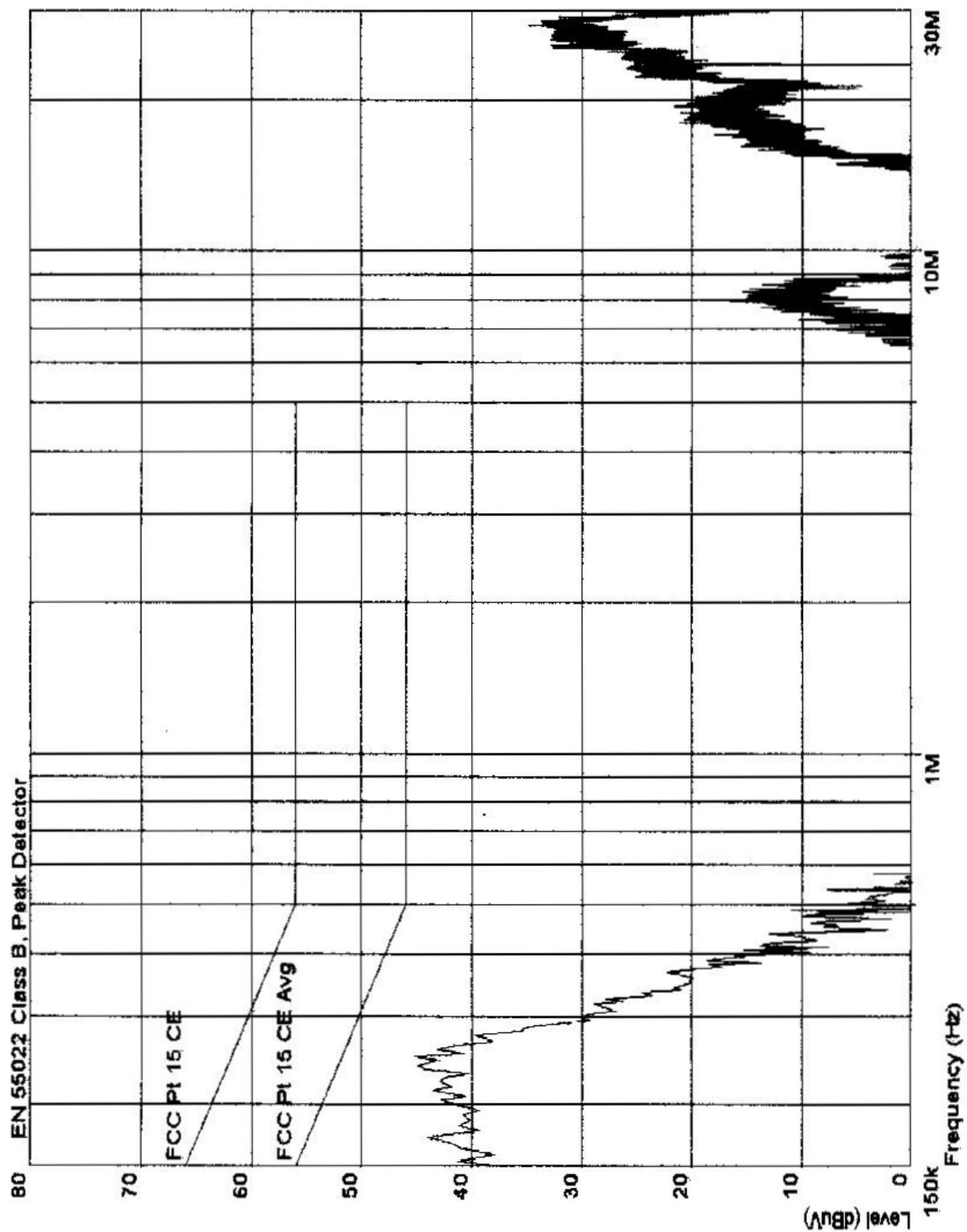
8.2.1.1 Test 2 - Figure 1 - Set-up Photographs



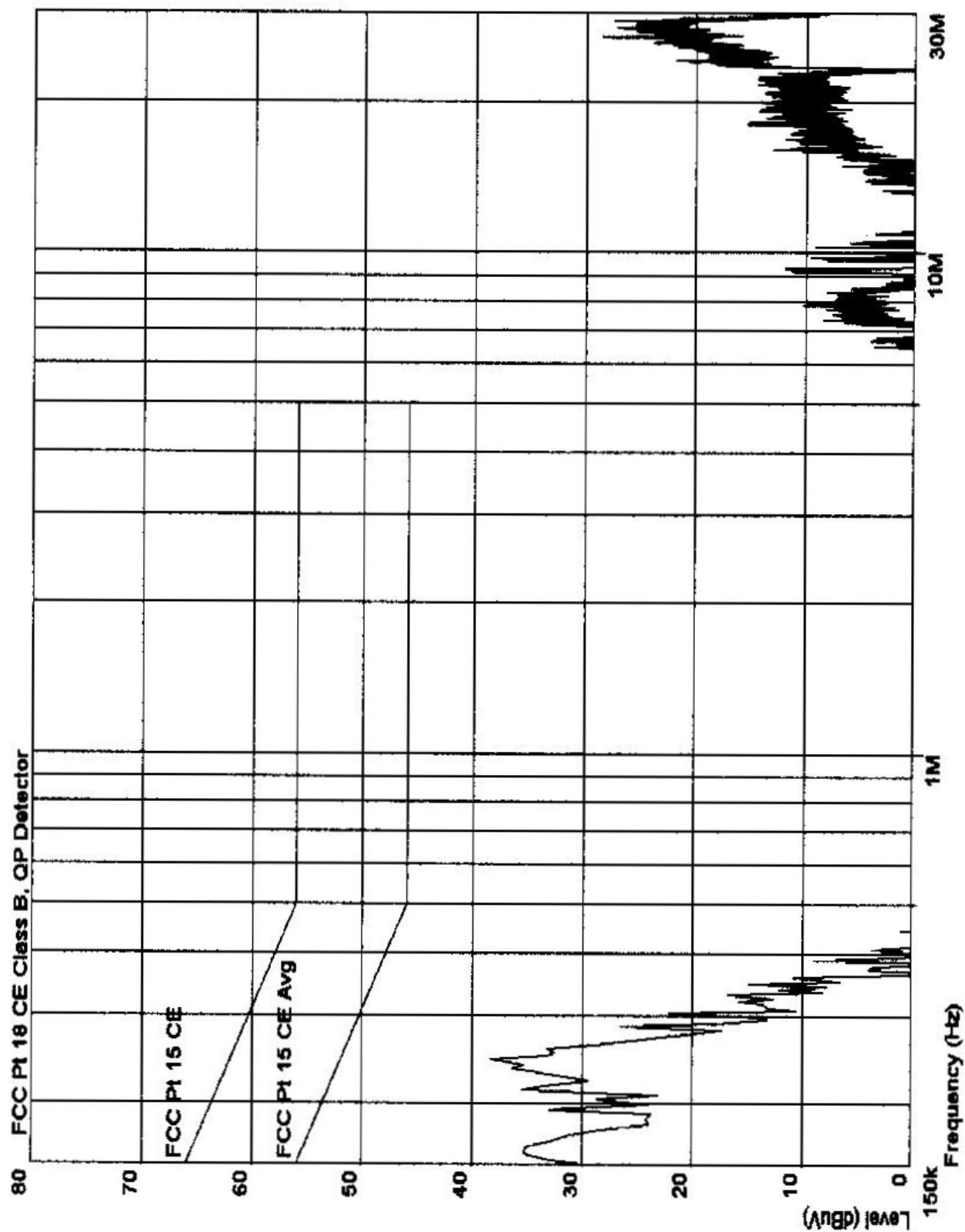
8.2.1.2 Test 2 – Figure 2 – 208V-60Hz – 10% fan 100% microwave oven - Black Line
Quasi Peak Detector

8.2.1.3 Test 2 - Figure 3 - 208V-60Hz – 100% fan, 525 deg F Heater - White Line
Quasi Peak Detector



8.2.1.4 Test 2 - Figure 4 - 208V-60Hz – 10% fan only - Black Line
Peak Detector

8.2.1.5 Test 2 - Figure 5 - 240V-60Hz – 50% fan, 50% Microwave - Black Line
Quasi Peak Detector



8.3 Test 3 - Radiated Emissions 30 MHz to 25 GHz (208V Supply)

8.3.1 Test 3a - Radiated Emissions 30 MHz to 1 GHz

Radiated emissions over the frequency range 30 MHz to 1 GHz were recorded at 1 m from the EUT whilst set-up in a screened room. During this test, checks were carried out to determine the mode of operation and cable configuration most likely to produce the maximum emissions.

The Test Equipment was verified for calibration and operation prior to being used.

During testing the EUT was powered up and operated. The worse case mode of operation was found to be 100%, the heaters being on or off was found to have no effect on the emission levels, testing on the OATS was carried out with heaters off. A dummy load of 1050milli-litres of tap water in a polypropylene container was placed in the centre of the EUT during testing of the microwave function.

The EUT was then set-up on a turn table on the 3 m Open Area Test Site (OATS) powered up from a 208V-60Hz supply, allowed to stabilize in its worse case mode of operation, as detailed in Para.3, set-up diagrams and the photograph in figure1.

The tests were carried out with a mains cables connected. No other cables were applicable.

Radiated emission tests were repeated over the full frequency range, paying particular attention at those frequencies detected in the screened room test. At each frequency detected, the height and polarization of the receive antenna was adjusted and the turntable rotated to record the maximum level on the receiver.

From figures 2 - 7, it can be seen that inside a screened room with the antenna approx.1 m from the EUT emissions were recorded. When the EUT was taken to the OATS, emissions above the ambient were detected and measured; particular attention being paid to the frequencies highlighted by the screened room investigations

No emissions were recorded above the limit line on the OATS; see figure 8 and table 1. It can therefore be stated that the radiated emissions were found to be within the requirements of the specification.

8.3.2 Test 3a - Test Equipment Used

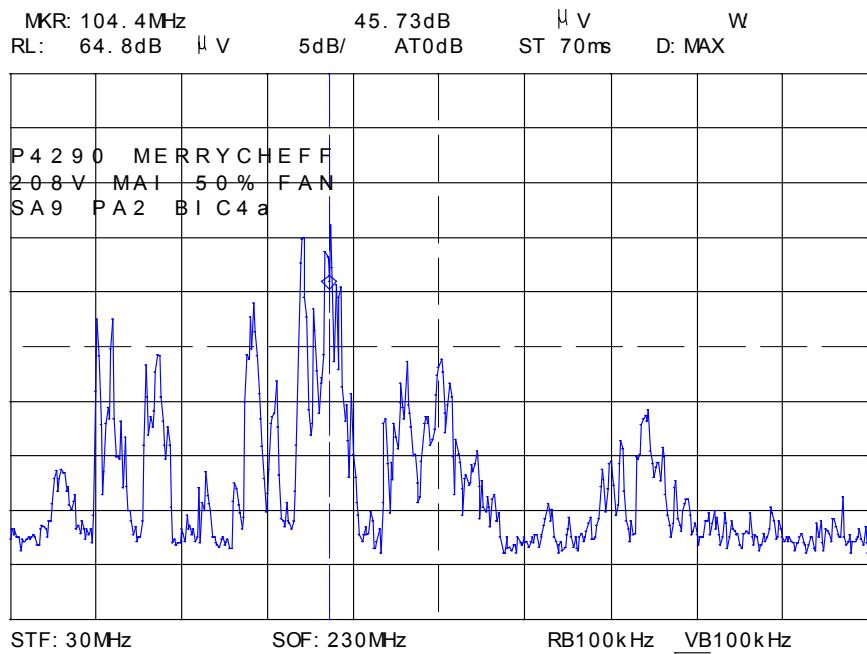
The following major items of test equipment were used for the radiated emission tests:

OATS Measurements	RX11	BA4	OATS2
Pre Scan	SA9	LP4	BIC4a

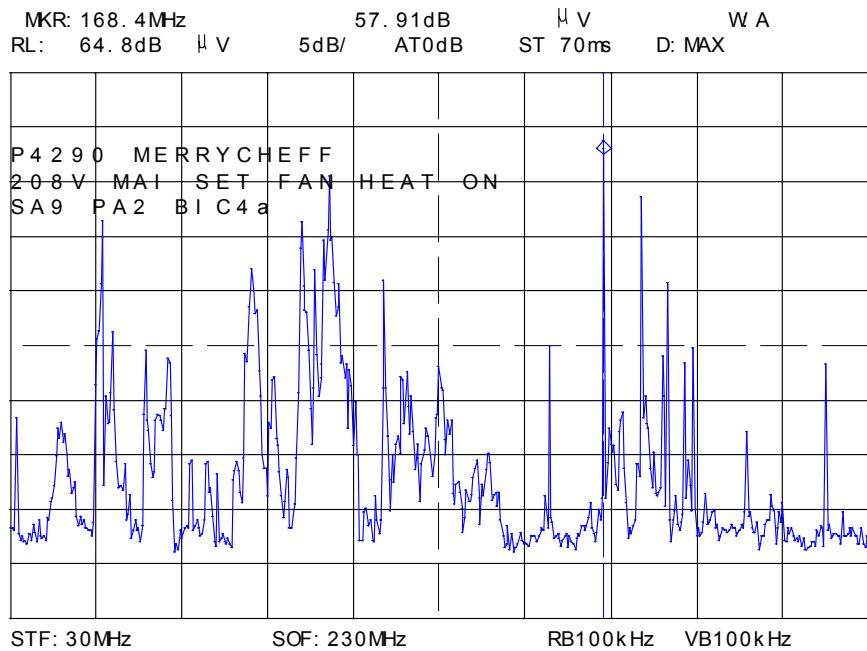
8.3.2.1 Test 3a - Figure 1 - Set-up Photographs



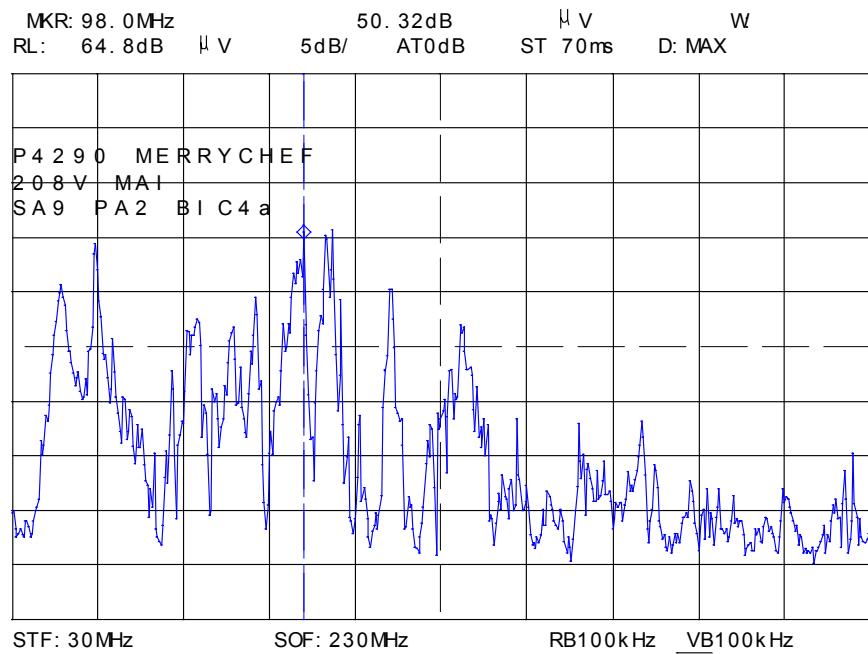
8.3.2.2 Test 3a - Figure 2 – 208V Oven – 30-230MHz 50% fan only
Screened Room Horizontal Emission Uncorrected at 1 metre from EUT



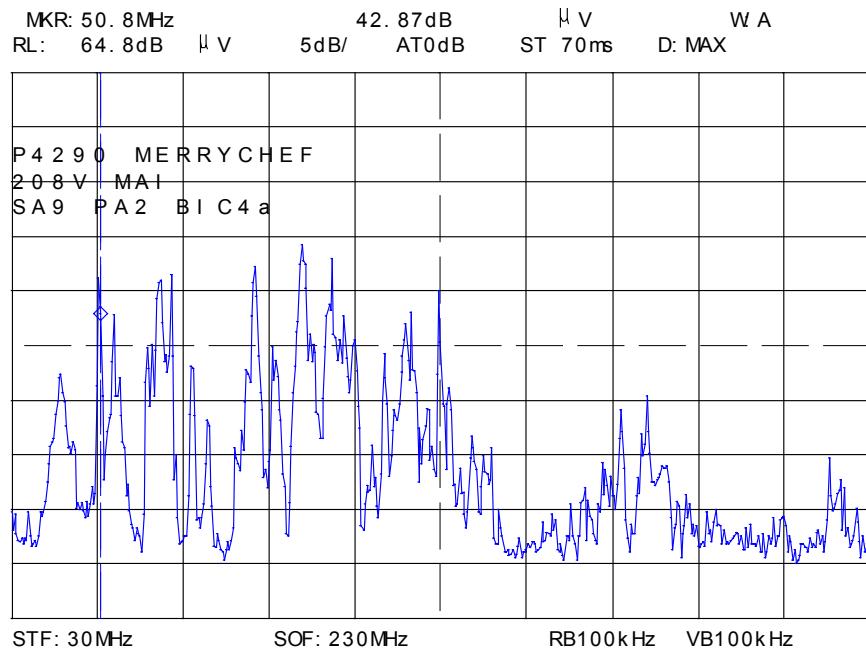
8.3.2.3 Test 3a - Figure 3 – 208V Oven – 30-230MHz set fan 525deg F heat setting
Screened Room Horizontal Emission Uncorrected at 1 metre from EUT



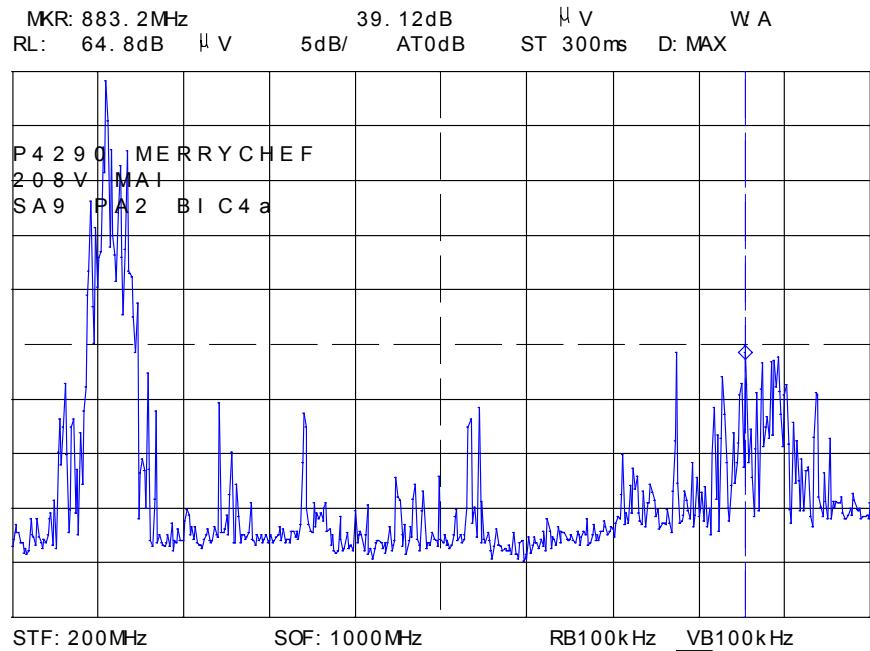
8.3.2.4 Test 3a - Figure 4 – 208V Oven – 30-230MHz 50% fan 50% Microwave Screened Room Vertical Emission Uncorrected at 1 metre from EUT



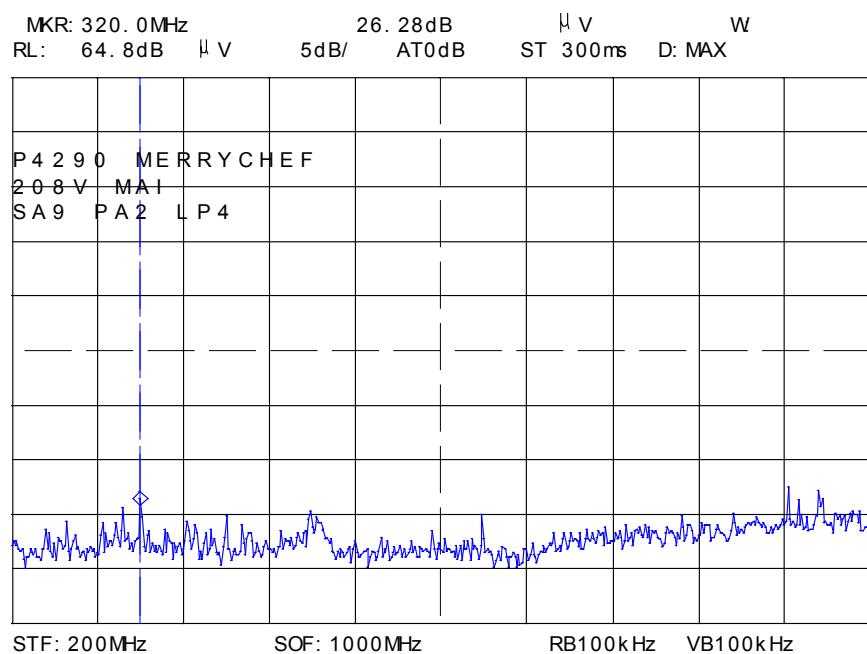
8.3.2.5 Test 3a - Figure 5 – 208V Oven – 30-230MHz 10% fan 100% Microwave Screened Room Horizontal Emission Uncorrected at 1 metre from EUT



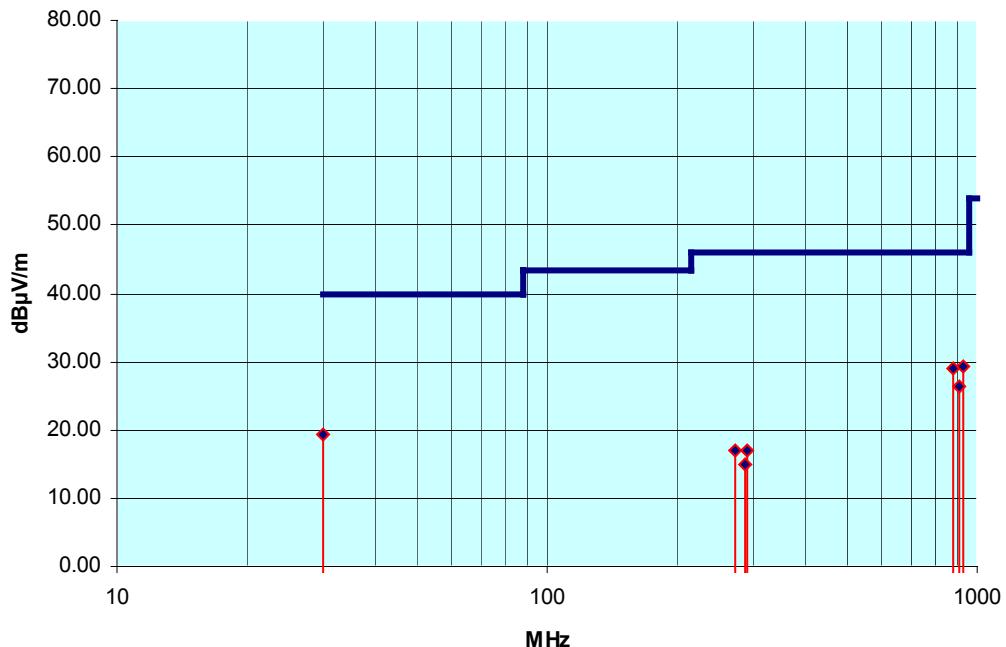
8.3.2.6 Test 3a - Figure 6 – 208V Oven – 200-1000MHz 10% fan 100% Microwave
Screened Room Horizontal Emission Uncorrected at 1 metre from EUT



8.3.2.7 Test 3a - Figure 7 – 208V Oven – 200-1000MHz set fan 525 deg F heater on
Screened Room Horizontal Emission Uncorrected at 1 metre from EUT



8.3.2.8 Test 3a - Figure 8 - Radiated Emissions



8.3.2.9 Test 3a - Table 1- Radiated Emissions, Data (Corrected for 10m OATS)

Frequency MHz	Reading dBµV/m	Antenna Correction dB	Cable Correction dB	Horizontal Vertical	Antenna Height meters	Turntable Position	Total dBµV/m	Pass Fail
30		18.10	1.20	V	1	Omni	19.30	Pass
275	1.00	12.30	3.70	V	1	Omni	17.00	Pass
290	-2.00	12.90	3.90	V	1	Omni	14.80	Pass
292	0.00	13.00	3.90	V	1	Omni	16.90	Pass
883	-2.00	23.20	7.70	V	1	Omni	28.90	Pass
905	-5.00	23.70	7.80	V	1	Omni	26.50	Pass
924	-3.00	24.40	7.80	V	1	Omni	29.20	Pass

8.3.3 Test 3b - Radiated Emissions 1 GHz to 25 GHz

Radiated emissions over the frequency range 1 GHz to 25 GHz were recorded 1 m from the EUT whilst set-up in a screened room. During this test, checks were carried out to determine the mode of operation and cable configuration most likely to produce the maximum emissions.

The Test Equipment was verified for calibration and operation prior to being used.

During testing the EUT was powered up and operated in the following modes with heaters on & off, fan on low, high and preset settings and microwave set at 100% and 50% of full output power. The operation of the heaters was found to have no effect on the emission levels, testing on the OATS was carried out with heaters off. A dummy load of 1400 and 600 milli-litres of tap water in polypropylene containers was placed in the centre and right hand corner of the EUT during testing of the microwave function as required by MP-5.

The EUT was then set-up on a turn table on the 3 m Open Area Test Site (OATS) powered up from a 208 V – 60 Hz supply, allowed to stabilise in its worse case mode of operation as detailed in Para.3, set-up diagram and photograph in figure1.

The tests were carried out with a mains cable connected. No other cables were applicable.

Radiated emission tests were repeated over the frequency range 1-25 GHz. Particular attention was paid to those frequencies detected in the screened room test. At each frequency detected, the height and polarization of the receive antenna was adjusted and the turntable rotated to record the maximum level at the receiver.

The maximum-recorded levels were corrected for antenna factor, cable losses and amplifier gain if required. The specification limits were then corrected, for distance of the antenna from the EUT and the power of the EUT. This was used to determine compliance with the standard as shown in figures 2-4 and table 1.

From the figures and table, it can be seen that the radiated emissions were found to be within the requirements of the calculated limits:

Limit = 25 μ V/m @ 300 m for 500 W

Limit = 72.1 dB μ V/m @ 3 m for a calculated power of 1.299 kW

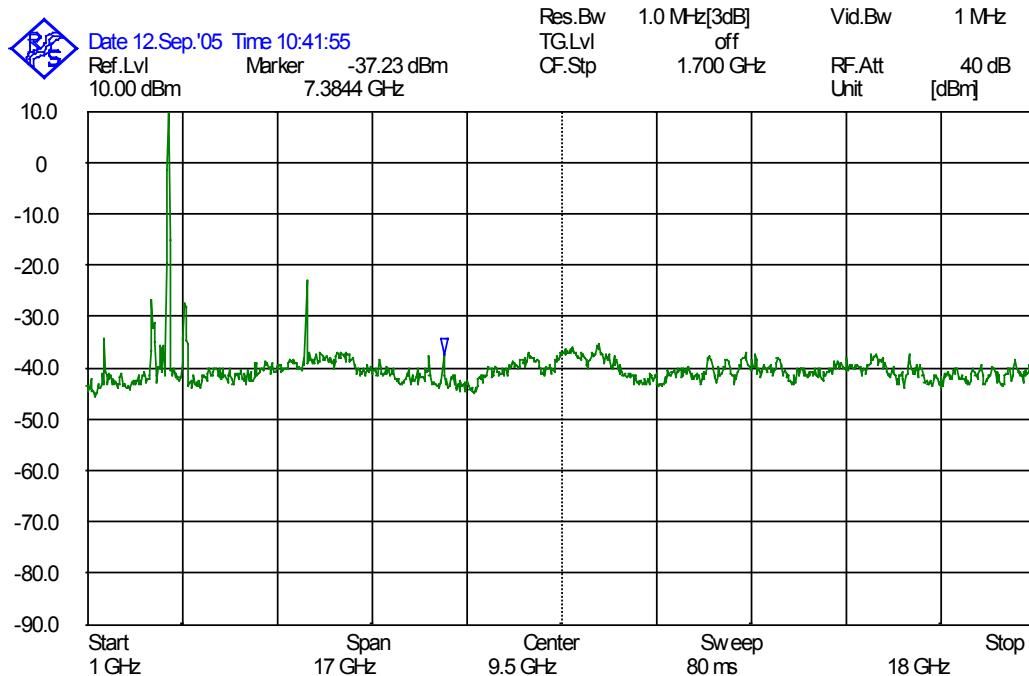
8.3.4 Test 3b- Test Equipment Used

The following major items of test equipment were used tests:

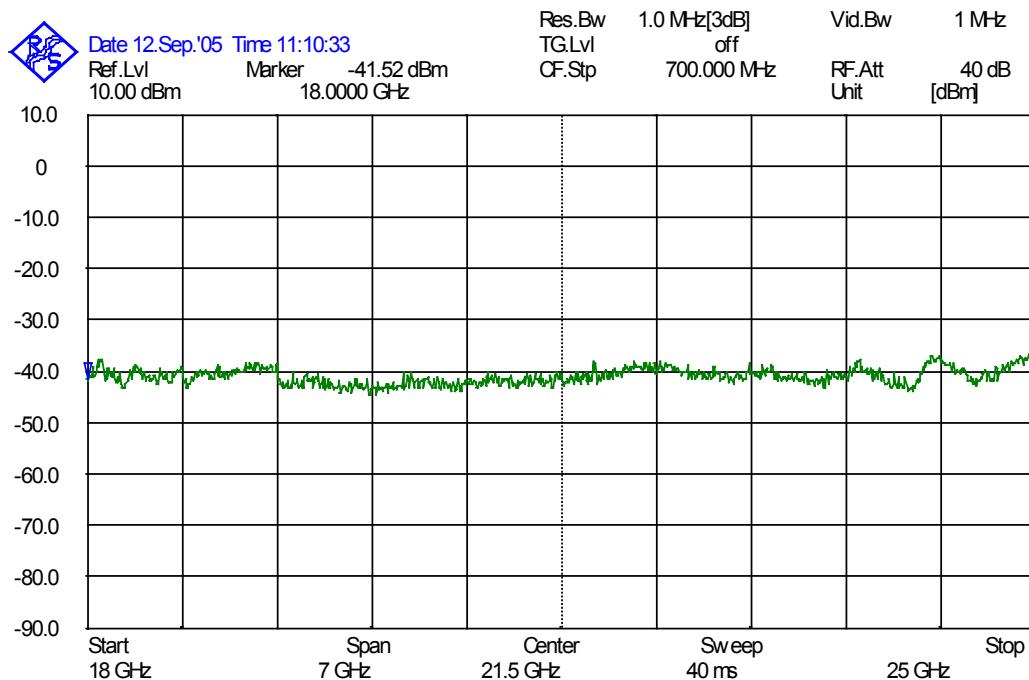
OATS measurements	EMCO	DRGFS	PA5	RX9	TC8	SA10
Pre-Scans	EMCO	DRGFS	PA5	RX9	TC8	SA10

8.3.5 Test 3b - Figure 1 - Set-up Photographs

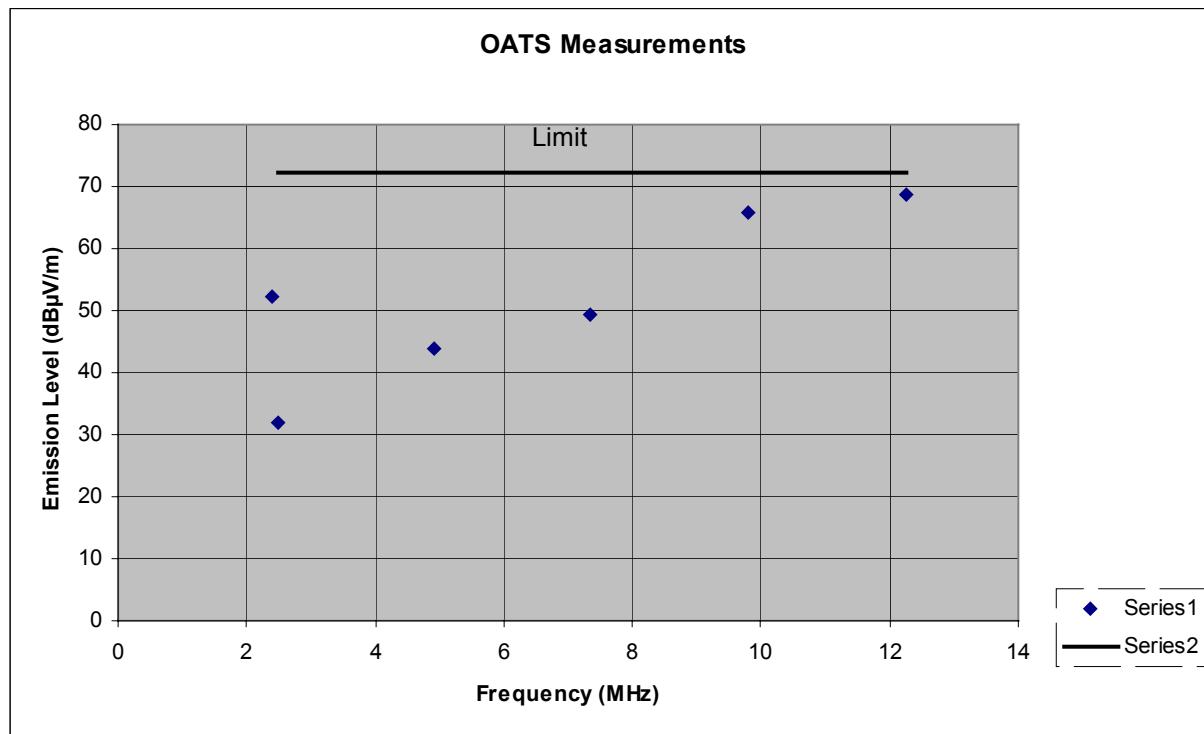
8.3.5.1 Test 3b - Figure 2-208 V-1.0 -18 GHz 10% Fan 100% Micro Screened Room Uncorrected Peak Detector at 1 m from EUT.



8.3.5.2 Test 3b - Figure 3-208 V-18 -25 GHz 50% Fan 50% Micro Screened Room Uncorrected Peak Detector at 1 m from EUT.



8.3.5.3 Test 3b - Figure 4 – 208V - Radiated Emissions Corrected



8.3.5.4 Test 3b - Table 1- Radiated Emissions, Data

Freq GHz	Total dB μ V/m	Limit dB μ V/m	Reading dB μ V/m	Distance Meters	Correction in dB				Type	Detector
					Distance	Pre Amp	Cable	Antenna		
2.4	52.4		45	3	0	34.1	2.5	28.5	DRGFS	Avg
2.5	31.9	72.1	35	3	0	34.1	2.5	28.5	DRGFS	Avg
4.9	44	72.1	41	3	0	33.9	3.7	33.2	DRGFS	Avg
7.35	49.5	72.1	43	3	0	33.8	4.3	36	DRGFS	Avg
9.8	65.8	72.1	67	1	10.5	34	5.3	38	DRGFS	Peak
12.25	68.7	72.1	67	1	10.5	32.4	5.6	39	DRGFS	Peak

9. CONCLUSIONS

The EUT was found to meet the specification requirements detailed when tested to the customer's requirements.

10. ANNEX A - TEST EQUIPMENT LIST

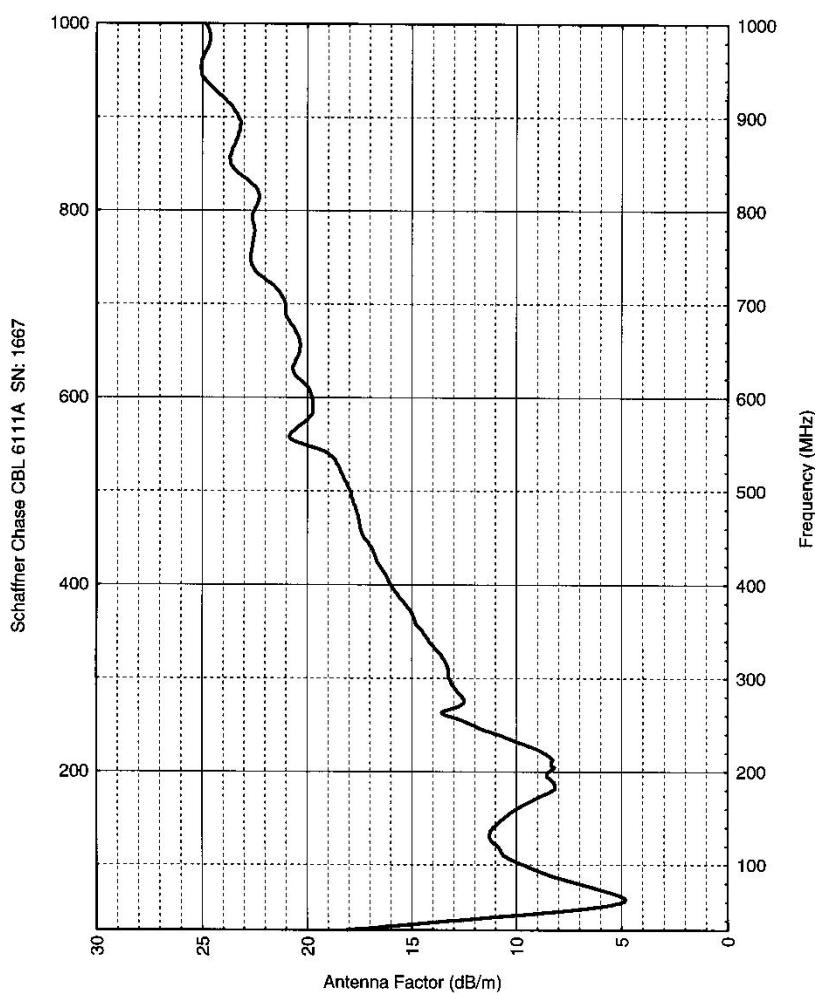
Plant No	Manufacturer	Description	Serial No	Cal Period	Cal Due
BA3	Chase	Bilog Antenna,CBL6111A	1733	24 Months	8 Sept 06
BA4	Chase	Bilog Antenna,CBL6111A	1667	24 Months	27 Mar 06
DL50/3	RS components	50W Load	613-690	12 Months	11 Nov 05
DRGFS	EMCO	3115	9701-5093	60 Months	23 April 06
L1/1	EMC Projects Ltd.	CISPR16 9kHz-30MHz (30A,50 /50µH), MIL STD 461D		12 Months	21 Jan 06
L1/2	EMC Projects Ltd.	CISPR16 9kHz-30MHz (30A,50 /50µH), MIL STD 461D		12 Months	21 Jan 06
L1/3	EMC Projects Ltd.	CISPR16 9kHz-30MHz (30A,50 /50µH), MIL STD 461D		12 Months	21 Jan 06
Horn 1	FMI	Standard Gain Horn Antenna 18-26.5GHz	1396	Calculated	-
OATS2	EMC Projects Ltd.	Open test site 2		12 Months	04 Jan 06
LHR	Chase	Receiver LHR7000	1028	12 Months	15-Mar-06
OATS2/1	EMC Projects Ltd.	Installed Receive Coax Cable on OATS2		12 Months	21 Jan 06
OATS2/2	EMC Projects Ltd.	Installed Receive Coax Cable on OATS2		12 Months	21 Jan 06
PA2	EMC Projects Ltd.	HF Pre Amplifier	001	12 Months	18 May 06
PA5	Hewlett Packard.	8449B Pre Amplifier	3008A00176	24 Months	22 Sept 05
Room1	Ray Proof	Screen room		12 Months	10 Jan 06
RX4	Rhode & Schwarz	EZM	894987/018	12 Months	25 July 06
RX6	Rhode & Schwarz	EZM	880726/012	12 Months	25 July 06
RX12	Rhode & Schwarz	Receiver EMI	838494/012	12 Months	03 June 06
RX14	Rhode & Schwarz	Receiver ESMI	839013/003	12 Months	03 June 06
SA9	Anritsu	Spectrum Analyser MS2601B	MT54360	12 Months	11 Oct 05
TC8	Reynolds	Cable Assembly 6 meters	548	12 Months	9 Jun 06
YI5	Yokogawa	Digital Temperature Indicator	2455	24 Months	25 April 06

11. ANNEX B - CORRECTION FACTORS

11.1 Antenna Correction Factors BA4 30-1000MHz

NATIONAL PHYSICAL LABORATORY Continuation Sheet

Figure 1
Antenna Factor (dB/m), Free Space
Antenna factor for antenna Schaffner Chase CBL 6111A, s/n 1667.



Reference : E04050046/5

Date of Issue : 27 May 2004

Checked by : *[Signature]*

Page 6 of 8

11.2 Antenna Correction Factors DRGFS 1-18GHz

RESULTS

Apparent Gain and Antenna Factor at 3m from the antenna aperture.		
Frequency [GHz]	Gain 3m [dBi]	Antenna Factor [dB (1/m)]
1.0	6.0	24.2
1.5	8.3	25.4
2.0	8.8	27.4
2.5	9.7	28.5
3.0	9.8	30.0
3.5	10.1	31.0
4.0	9.8	32.5
4.5	11.0	32.3
5.0	10.9	33.3
5.5	10.9	34.1
6.0	11.4	34.4
6.5	12.2	34.3
7.0	11.8	35.3
7.5	11.3	36.4
8.0	11.5	36.8
8.5	11.5	37.4
9.0	11.5	37.8
9.5	12.0	37.8
10.0	12.1	38.1
10.5	12.6	38.1
11.0	12.7	38.4
11.5	12.9	38.5
12.0	12.6	39.2
12.5	13.5	38.7
13.0	13.2	39.3
13.5	12.2	40.6
14.0	11.0	42.2
14.5	11.1	42.3
15.0	13.4	40.3
15.5	16.0	38.0
16.0	16.7	37.6
16.5	16.0	38.6
17.0	14.3	40.6
17.5	10.9	44.2
18.0	6.6	48.8

Reference: E01030092

Page 3 of 4

Checked by:



Last Page Intentionally
Left Blank