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TEST REPORT No: P4700/1

Customer/Applicant:	Merrychef Limited
Address:	Station Road West Ash Vale Aldershot Hampshire GU12 5XA
Subject:	**ELECTROMAGNETIC COMPATIBILITY**
Customer Ref:	28888
Manufacturer:	Merrychef Limited
Product:	Microwave Combination Oven
Model/Trade Name:	412s Microwave Assisted Impinger (MAI) - FCC ID : PCV412SMTV6DK
Model No/Type:	412S
Serial No/Lot No:	0507001822
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	**Checked By:**	M.J.Wood
Title:	(EMC Engineer)	**Title:**	(Technical and Managing Director)
Signature		**Signature**	
Issue Date:	June 2007		

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.

Report Summary

Report No:	P4700/1
Test Standard:	CFR 47 Part 18 Sections 18.305 & 18.307
Carried Out At:	EMC Projects Ltd., Ringwood, Hants, BH24 2DB
Equipment Tested:	412s Microwave Assisted Impinger (MAI) - FCC ID : PCV412SMTV6DK
Model No:	412S
Serial No:	0507001822
Software Version:	-
Carried Out On:	5th-14th June 2007
Test Engineer:	Mr Frank Barkas
In Attendance:	Mr Paul Harrison
Signature	P. Harrison Date 9 July 2007

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 1483 Watts	11-13	2.45GHz.+/- 50MHz
2	Conducted Emissions	CFR 47 Part 18 Section 18.307 Limits	Pass >5 dB below the limit	14-23	208V-60Hz Supply 240V-60Hz Supply
3	Radiated Emissions	CFR 47 Part 18 Section 18.305 ISM greater than 500W Limits	Pass >10dB below the limit	24-45	3m Open Area Test Site

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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 60 Hz 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
Pre set	Go to 525	-	208	Passed
Pre set	Set to 525	-	208	Passed
Pre set	Go to 525	-	240	Passed
100	-	100	208	Passed
100	-	100	240	Passed
50	-	50	208	Passed
10	-	100	208	Passed

For the mode applied see individual test results.

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

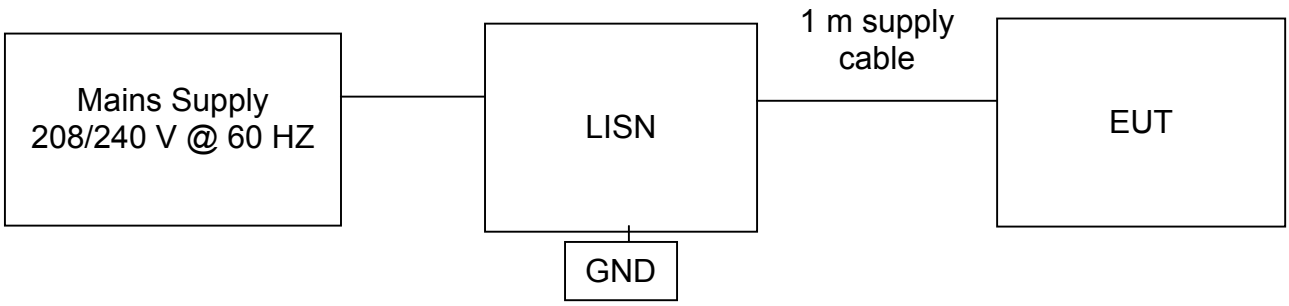
The appliance operates from 208 to 240 V nominal mains, full testing was carried out at a supply voltage of 208 V and partial (conducted emissions) were carried out at a supply voltage of 240 V. The EUT auto sensed the input voltage and directed the input to the required input transformer terminals, this resulted in the circuits after the transformer being the same for both input volts. The heating elements are passive; therefore only limited testing to the heater circuits was 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 paragraph 3.1 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, was 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 Block Diagram of EUT Set-up



3.2 Conducted Emissions (208 V & 240 V System)

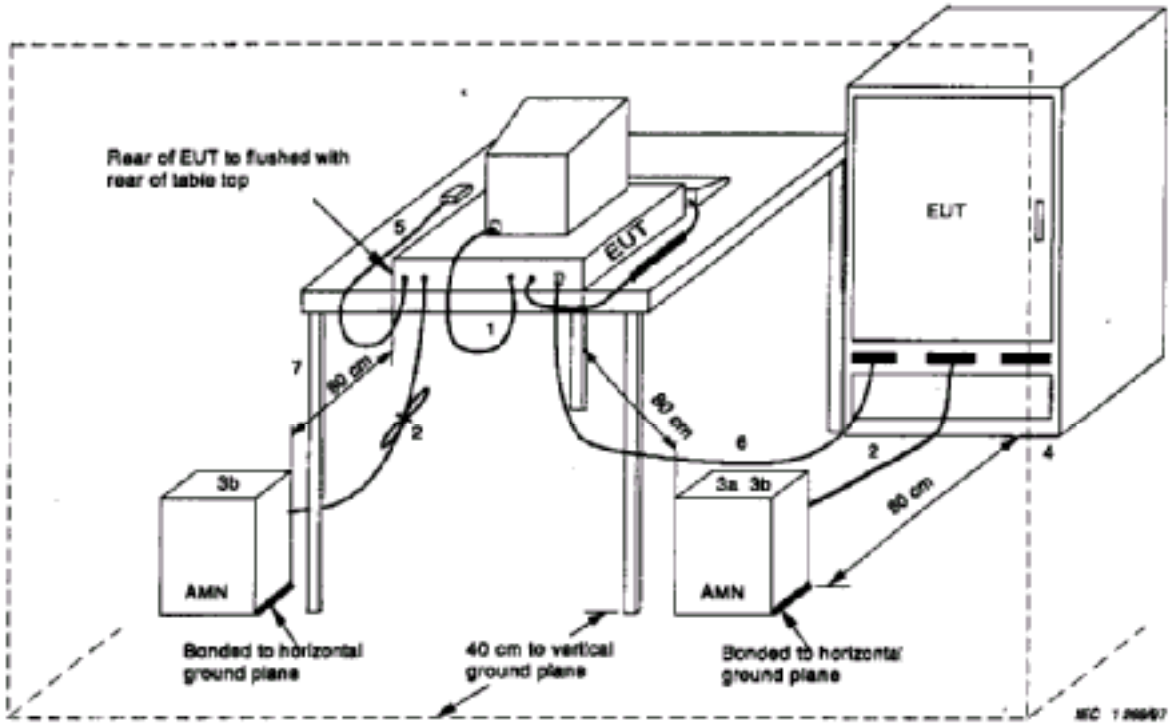
The EUT being Table Top Equipment was set-up upon a non-metallic table measuring 800 mm x 800 mm, 800 mm above the conducting ground plane and 400 mm from the vertical conducting surface in Screened Room No 1, as indicated in the test set-up and set-up photographs.

The EUT was powered from a filtered 208/240 V - 60 Hz supply via Line Impedance Stabilising Networks (LISN's). The LISN was mounted and bonded to the conducting ground plane 800 mm 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 40 cm in length to ensure the overall length did not exceed 1 m.

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

3.2.1 General Test Set-up - Table Top Equipment



AMN = artificial mains network (LISN)
EUT = equipment under test

1) If cables which hang closer than 40 cm to the horizontal metal ground plane cannot be shortened to appropriate length, the excess shall be folded back and forth forming a bundle 30 cm – 40 cm 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 40 cm whichever is lower.
7) Mains and signal cables shall be draped to the floor. No extension cords shall be used to the mains receptacle.

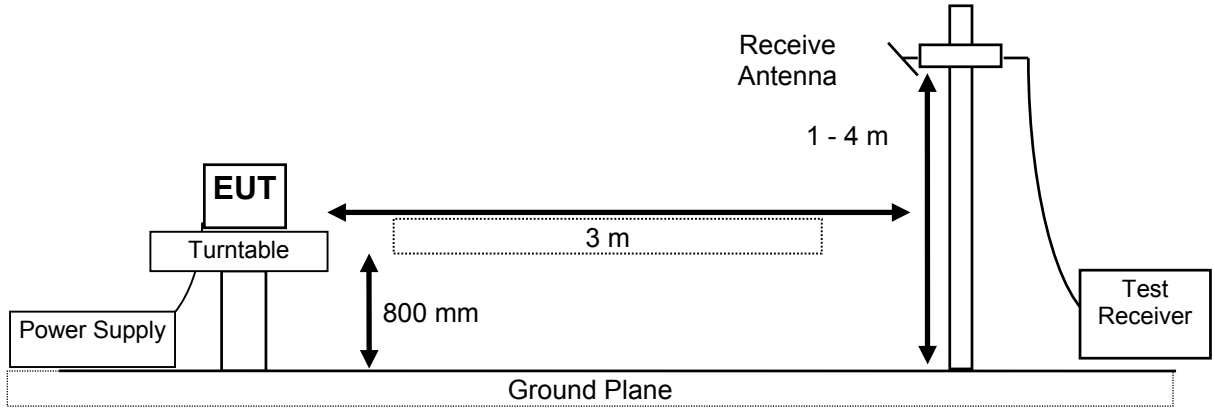
3.3 Radiated Emissions (208 V System)

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 800 mm above the conducting ground plane; the lay out 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 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:

Temperature Recorded:	19-23°C
Humidity Recorded:	50-56 %
Atmospheric Pressure:	1020-1022 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 (208 V 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 9 kHz or 10 kHz as required by the detector function. 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 equipment.

6.3 Radiated Emissions (208 V 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 360 deg.

The recorded emissions shall be compared against the limits for CFR 47 Part 18.305 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 2.45 GHz +/-50 MHz 208 V-60 Hz Supply
2	Conducted Emissions	CFR 47 Part 18 Section 18.307	208 V-60 Hz Supply 240 V-60 Hz Supply
3	Radiated Emissions	CFR 47 Part 18 Section 18.305	3 m Open Area Test Site 208 V-60 Hz Supply

8 TEST RESULTS

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

8.1.1 Test 1a Power Output (208 V System)

The EUT was set-up as shown in paragraph 3.1, the microwave set to 100% of full power, 10% fan, with a dummy load consisting of 2000 milli-litres of tap water contained in a low loss borosilicate beaker positioned in the centre of the microwave oven; the average temperature rise of the water over 3 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 20 Amps, 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) 32.03
q = quantity of water(cm^3) 2000 milli-litres	T = heating time (min) 3

P = 1483.0 Watts without an allowance for the container

8.1.2 Test 1b Fundamental Frequency (208 V System)

The 208 V EUT was set-up as shown in paragraphs 3.1 and 8.1.4, the microwave was set to 100% of full power with 10% fan and a dummy load consisting of 2000 milli-litres of tap water contained in a low loss borosilicate beaker positioned in the centre of the microwave oven. The fundamental frequency was recorded and found to remain within the ISM band of 2.45 GHz +/- 50 MHz.

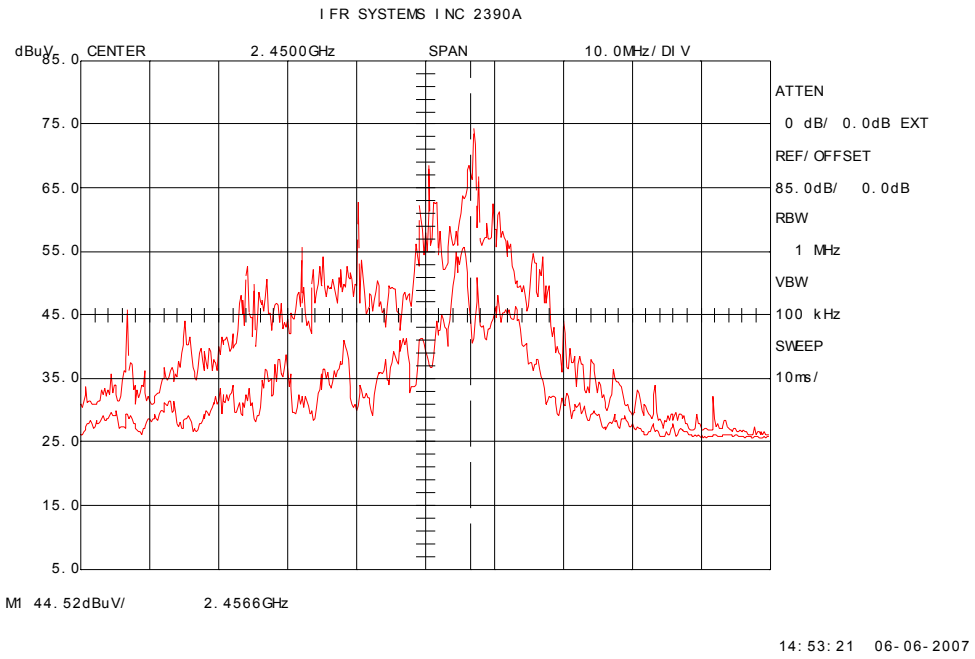
8.1.3 Test 1 - Test Equipment Used

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

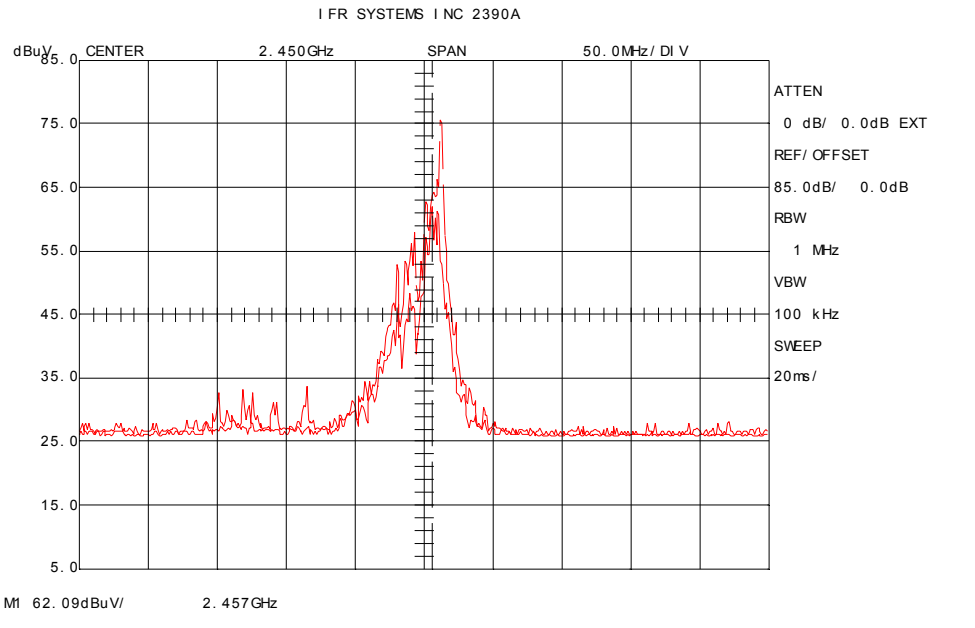
DRGFS	SA10	TP1	Room 1	-	-

8.1.4 Test 1b - Set-up Photographs

8.1.5 P4700 Horz Ant 2.45 GHz 100% Micro 100% Fan 100 MHz Avg



8.1.6 P4700 Horz Ant 2.45 GHz 100% Micro 100% Fan 500 MHz Avg



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 Stabilisation Networks (LISN's). The format for the layout was as detailed in Paragraph 3, set-up diagrams with the actual layout as the photograph in Paragraph 8.2.2.

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 1400 milli-litres of tap water in a low loss borosilicate 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 in modes of operation detailed. The results depicted in Paragraphs 8.2.3 - 8.2.16 are representative worse case graphs.

Paragraphs 8.2.3 – 8.2.16 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.

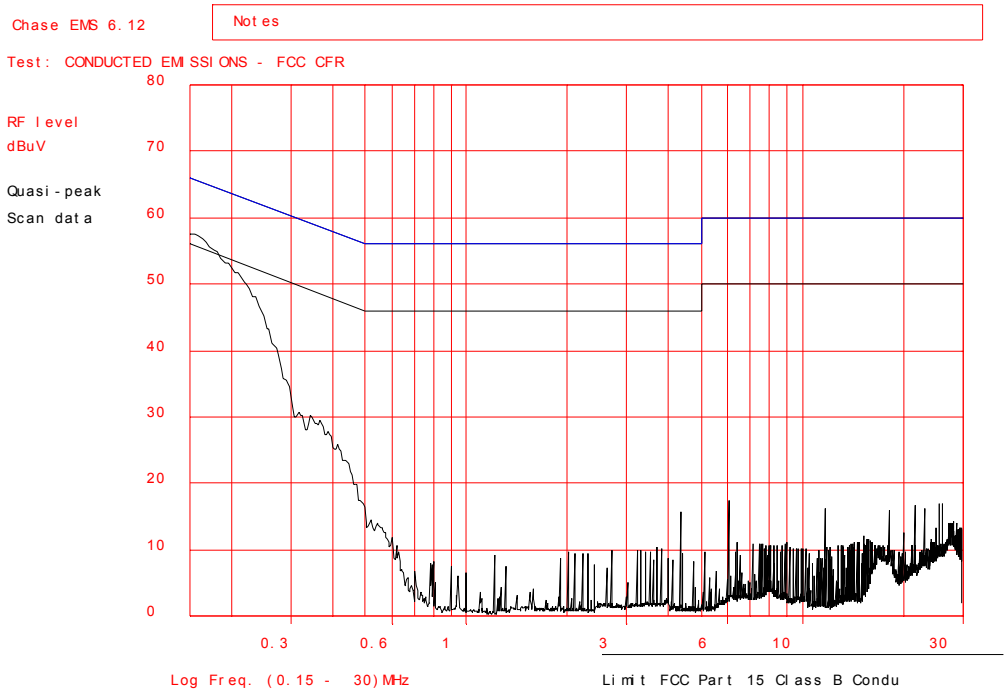
8.2.1 Test 2 - Test Equipment Used

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

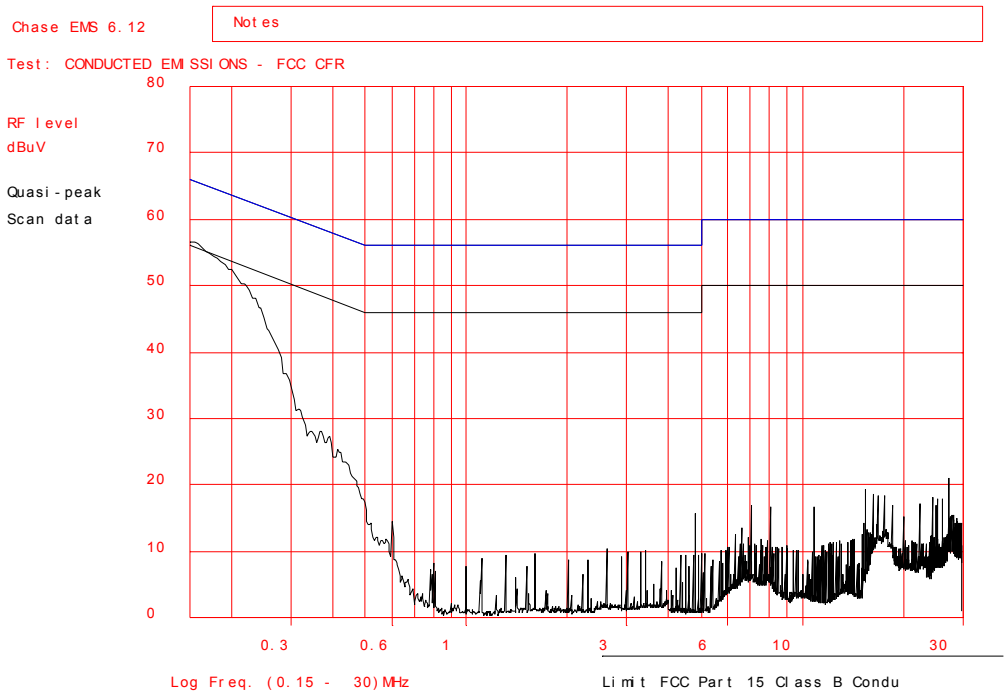
LHR	L1/1	L1/2	L1/3	Room 1

8.2.2 Test 2 - Set-up Photographs

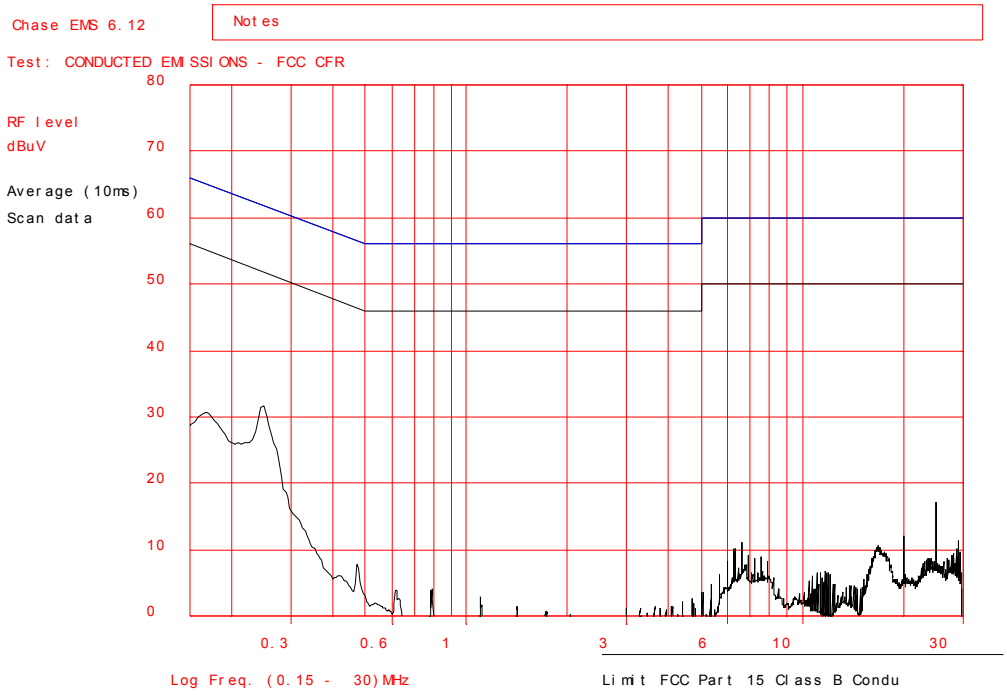
8.2.3 P4700 Line 2 Heaters On Pre Heat 150 kHz-30 MHz Pre Heat Q Peak



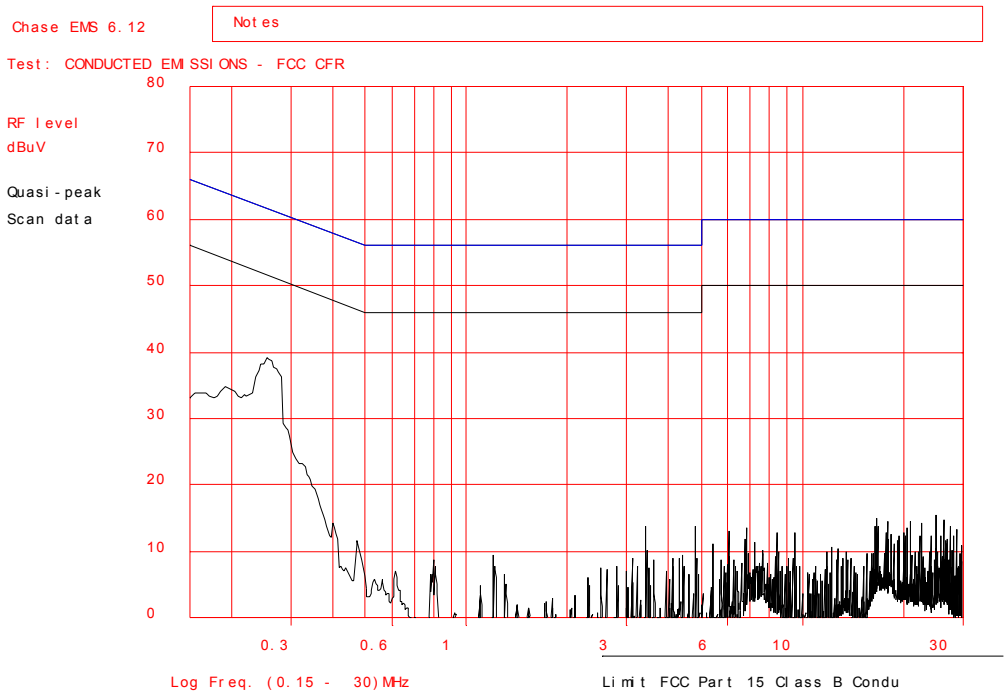
8.2.4 P4700 Line 1 Heaters On Pre Heat 150 kHz-30 MHz Pre Heat Q Peak



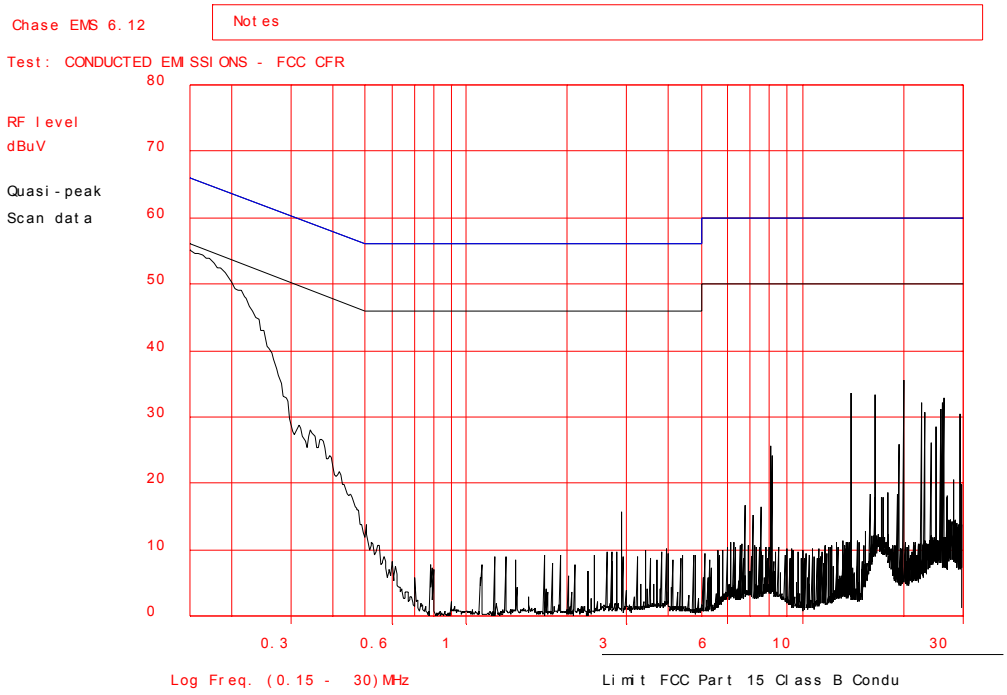
8.2.5 P4700 Line 1 Heaters On 150 kHz-30 MHz Pre Heat Avg Det



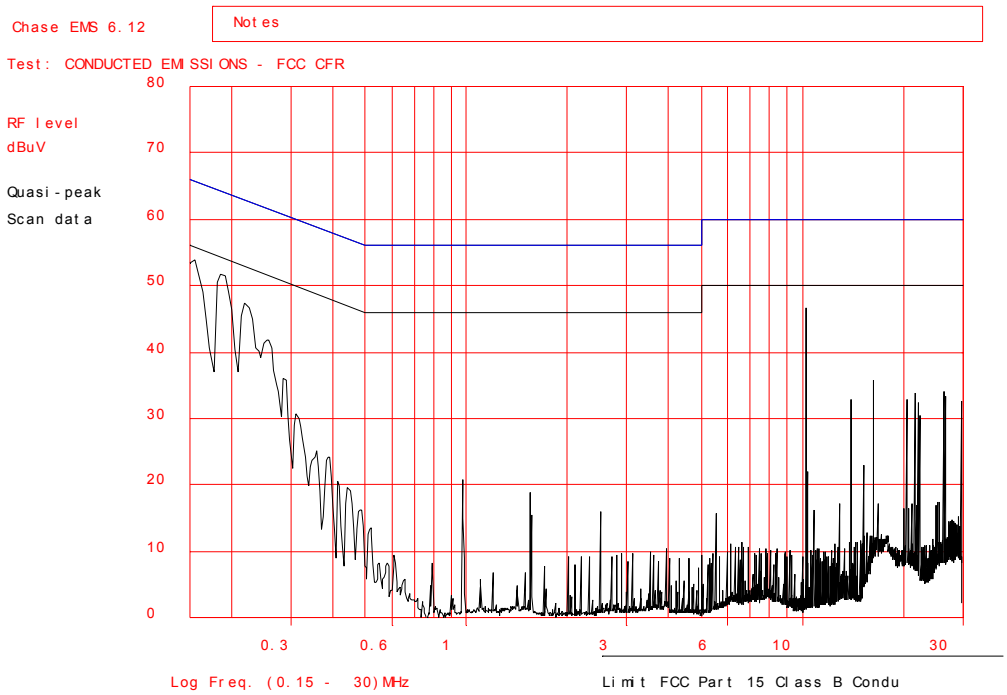
8.2.6 P4700 Line 1 Cooling On 150 kHz-30 MHz QPeak Det



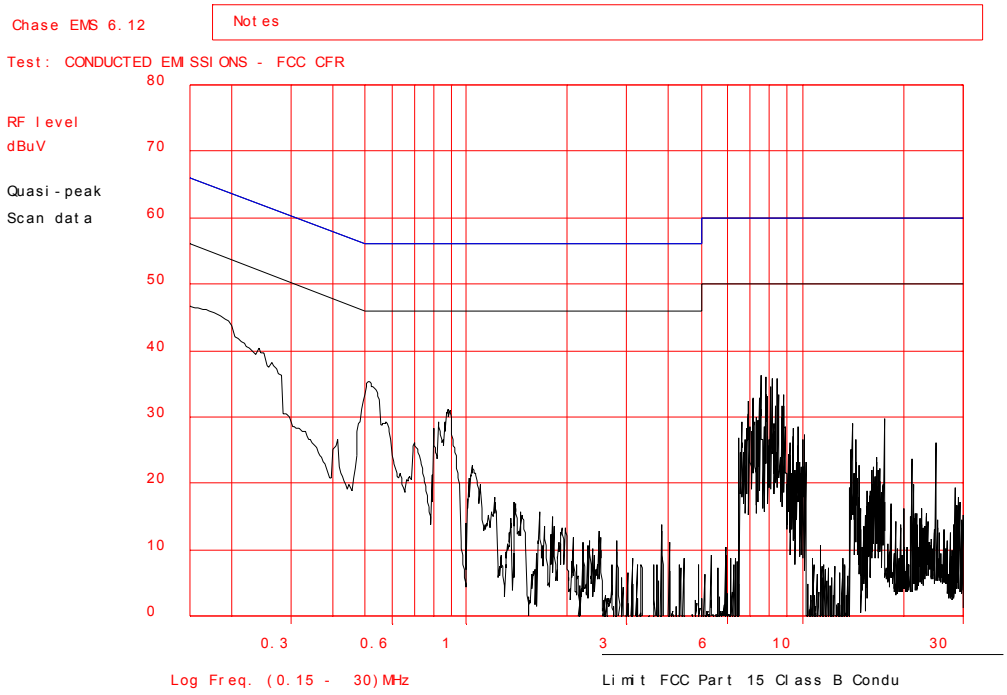
8.2.7 P4700 Line 1 Heater On 150 kHz- 30 MHz 100% Fan



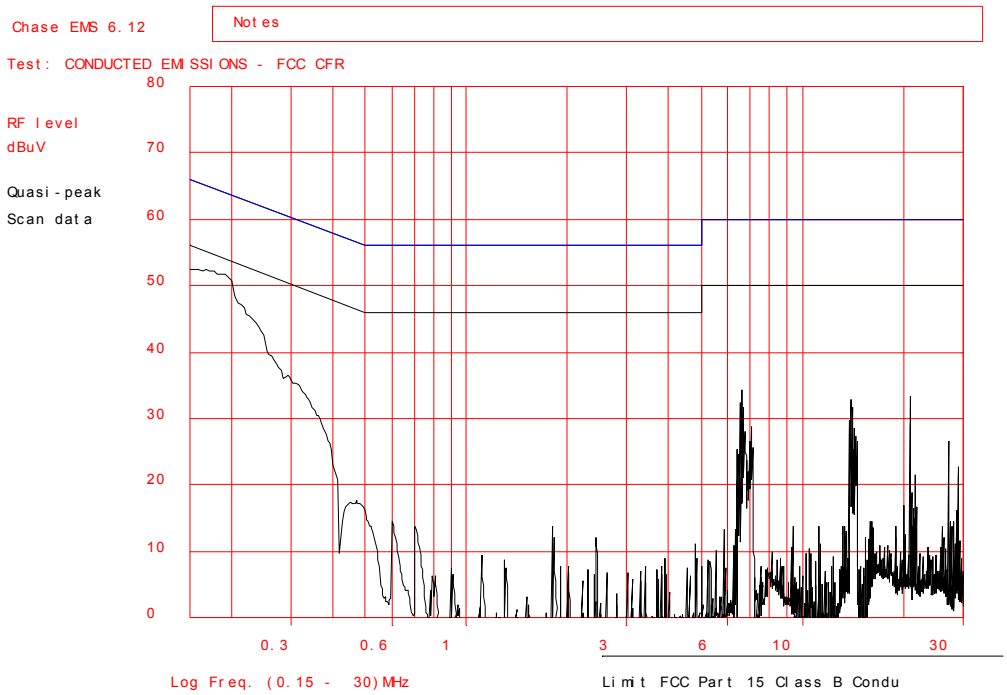
8.2.8 P4700 Line 1 Heater On 150 kHz- 30 MHz 10% Fan



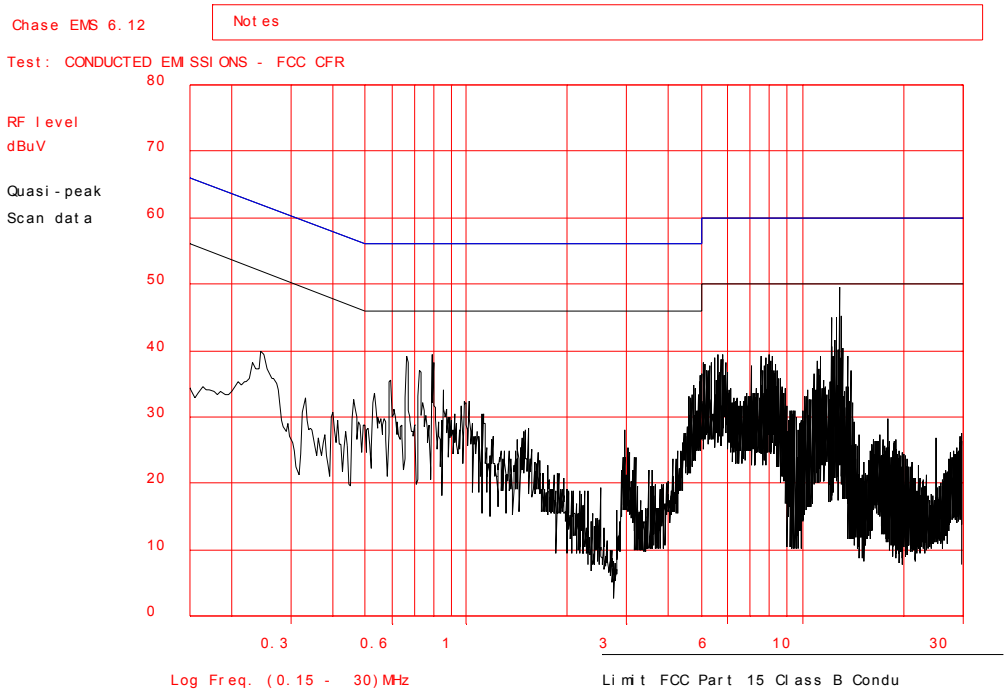
8.2.9 P4700 Line 2 Heater On 150 kHz- 30 MHz 10% Fan 50% Micro



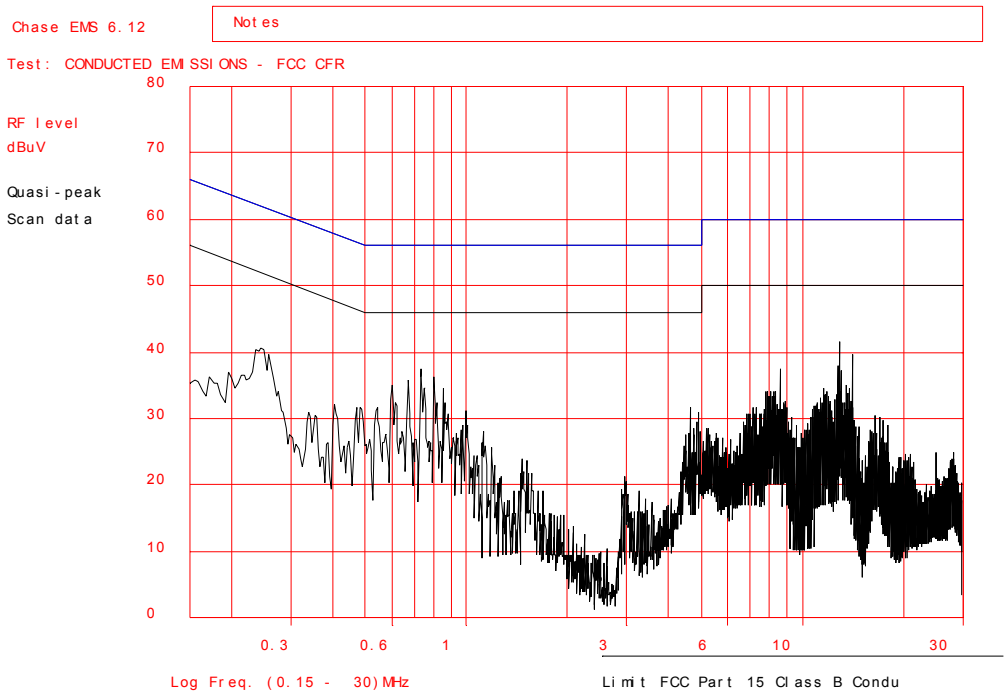
8.2.10 P4700 Line 2 Heater On 150 kHz- 30 MHz 10% Fan 10% Micro



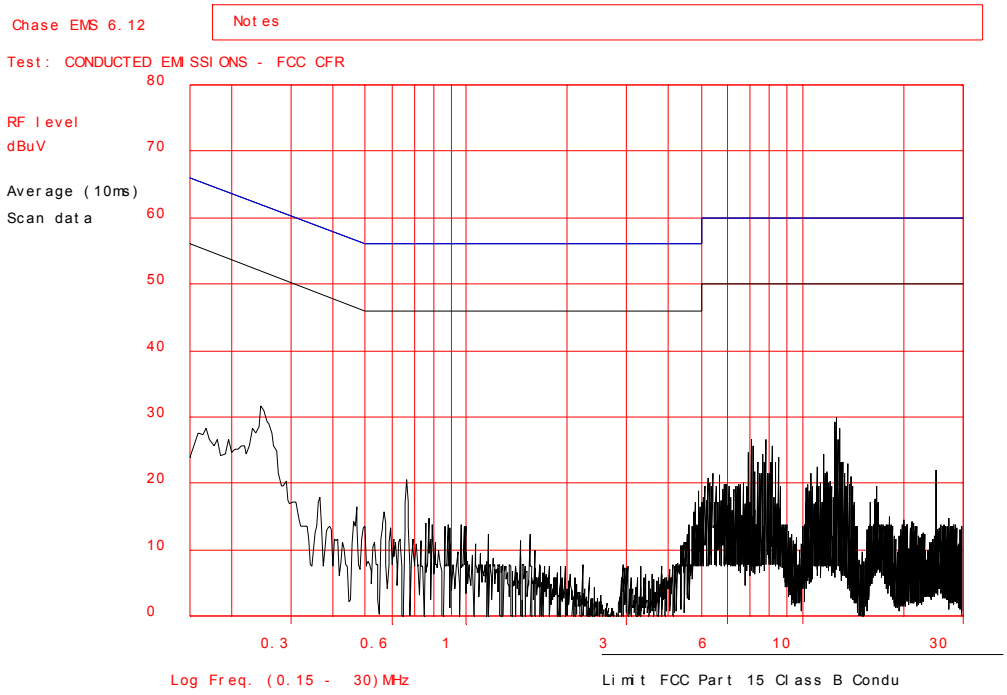
8.2.11 P4700 Line 1 100% Fan 100% Micro 150 kHz- 30 MHz 1.4 Lt water



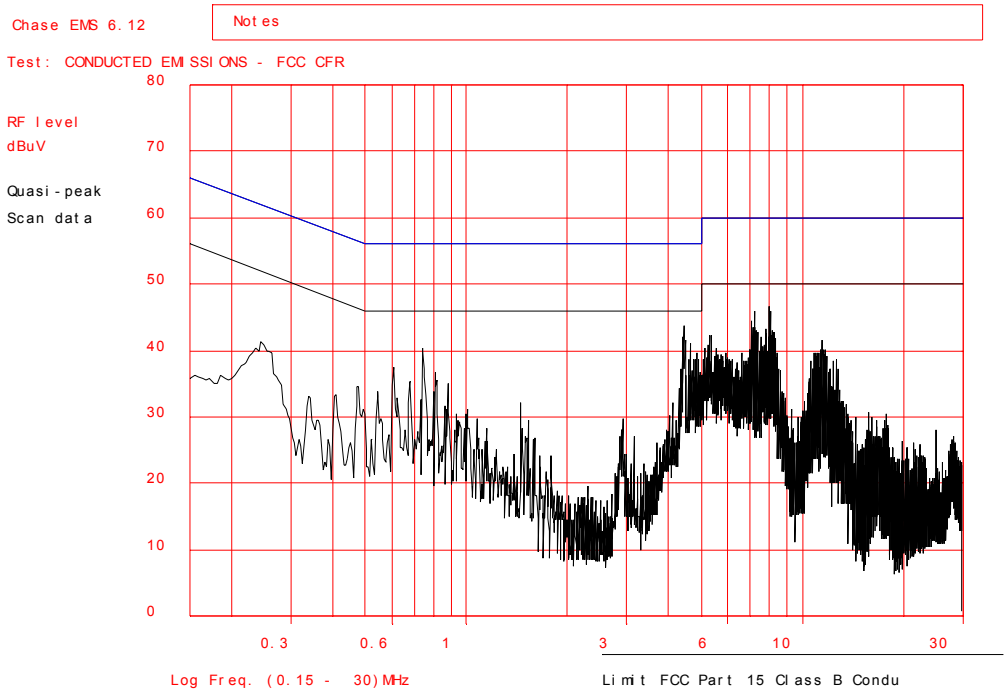
8.2.12 P4700 Line 2 100% Fan 100% Micro 150 kHz- 30 MHz 1.4 Lt water



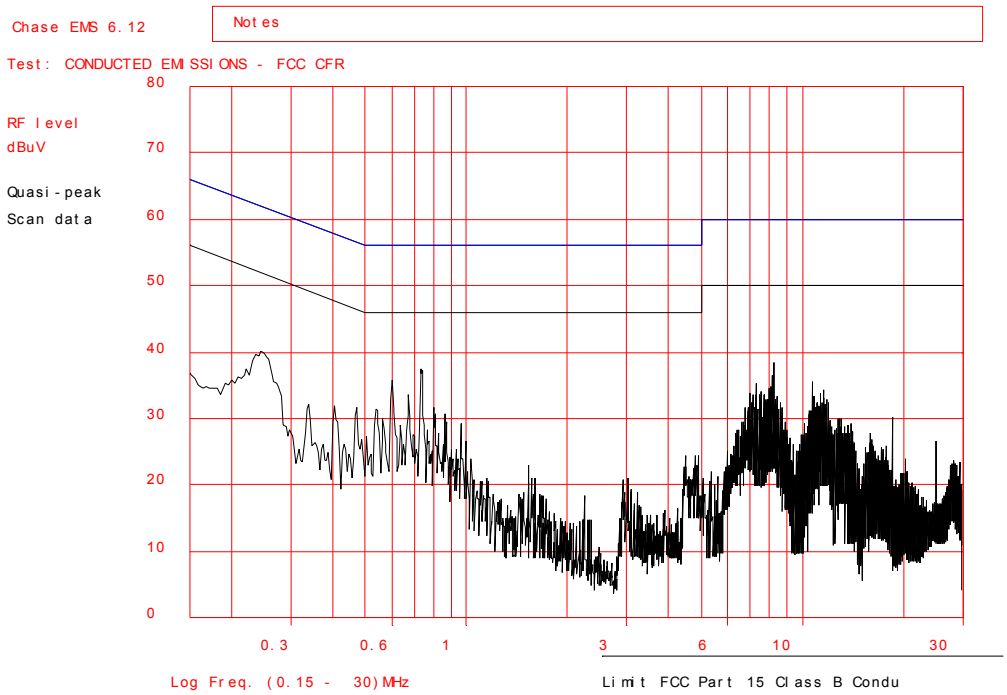
8.2.13 P4700 Line 1 100% Fan & Micro 150 kHz- 30 MHz 1.4 Lt water Avg



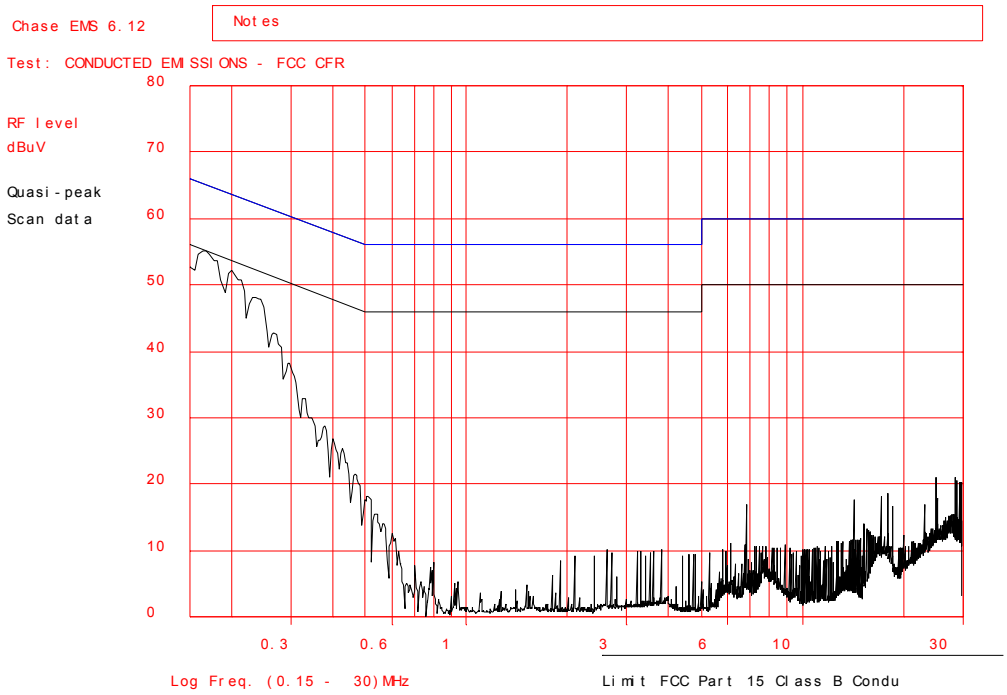
8.2.14 P4700 Line 1 100% Fan & Micro 150 kHz- 30 MHz 1.4 Lt water 240V



8.2.15 P4700 Line 2 100% Fan & Micro 150 kHz- 30 MHz 1.4 Lt water 240V



8.2.16 P4700 Line 2 Heaters On 150 kHz- 30 MHz Pre Heat 240V



8.3 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 1400 milli-litres of tap water in a low loss borosilicate 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 208 V - 60 Hz supply, allowed to stabilise in its worse case mode of operation, as detailed in Paragraph 3, set-up diagrams and the photograph in paragraph 8.3.2.

The tests were carried out with a mains cable 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 polarisation of the receive antenna was adjusted and the turntable rotated to record the maximum level on the receiver.

From paragraph 8.3.3 – 8.3.18, 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 Paragraphs 8.3.19 – 8.3.20. It can therefore be stated that the radiated emissions were found to be within the requirements of the specification.

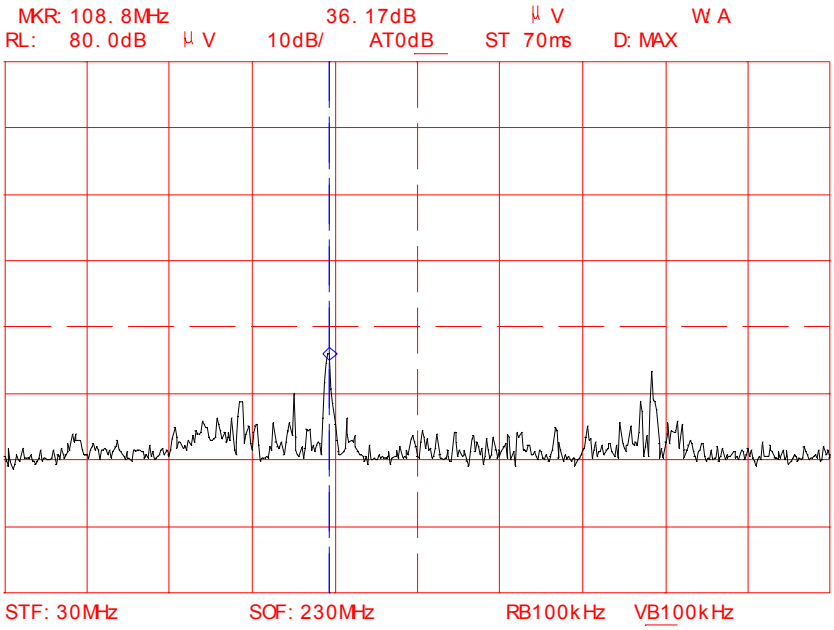
8.3.1 Test 3a - Test Equipment Used

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

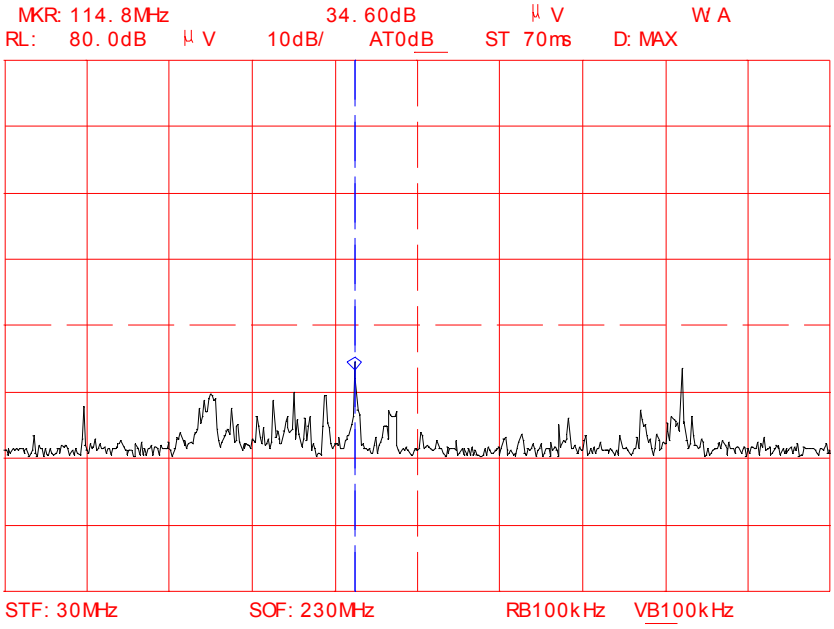
OATS Measurements		RX11	BA4	OATS2
Pre Scan		SA8	BA3	Room 1

8.3.2 Test 3a - Set-up Photographs

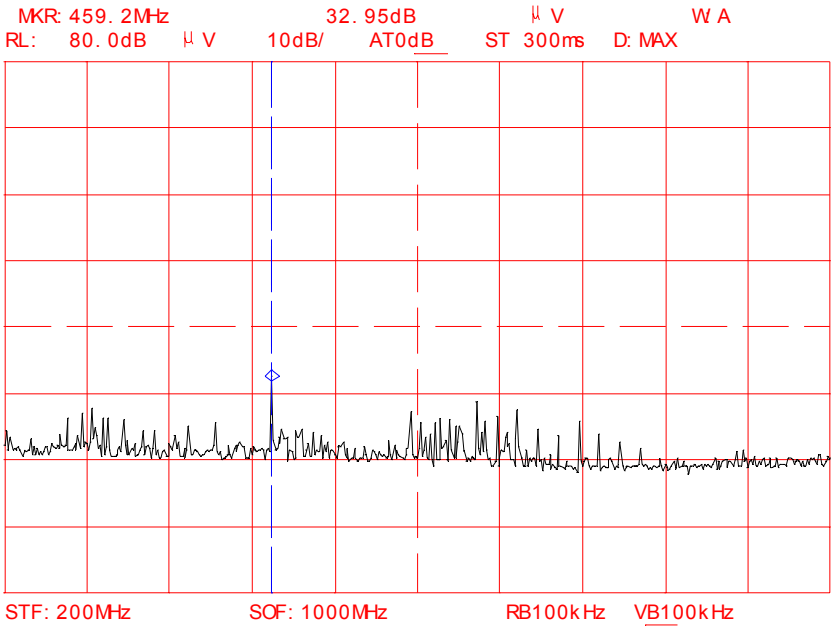
8.3.3 P4700 Vert Ant Heaters On Pre Heat 30-230 MHz Pre Heat Peak



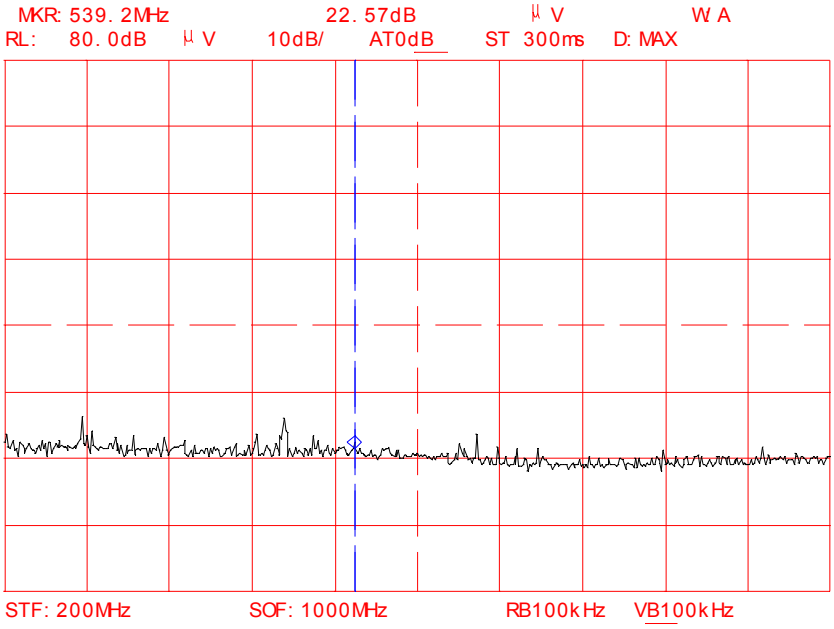
8.3.4 P4700 Horz Ant Heaters On Pre Heat 30-230 MHz Pre Heat Peak



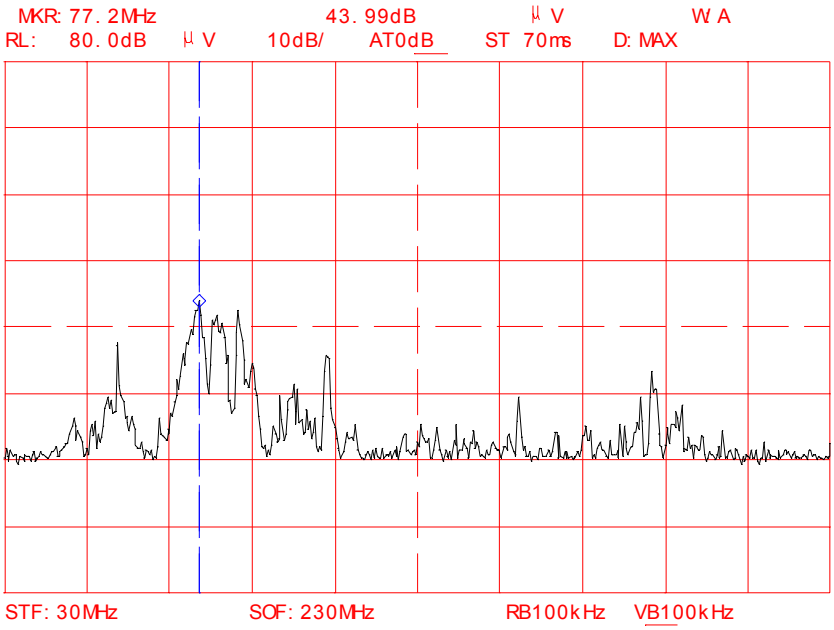
8.3.5 P4700 Vert Ant Heaters On Pre Heat 200-1000 MHz Pre Heat Peak



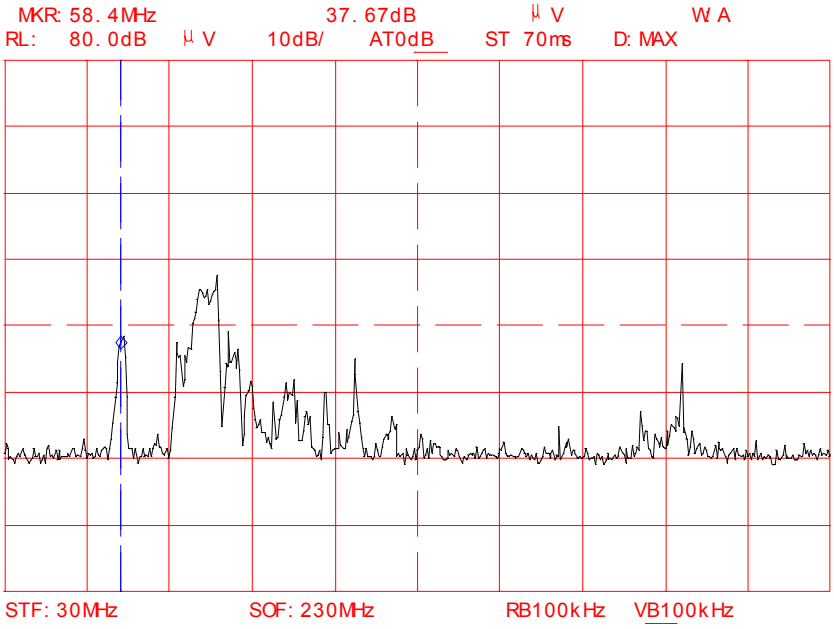
8.3.6 P4700 Horz Ant Heaters On Pre Heat 200-1000 MHz Pre Heat Peak



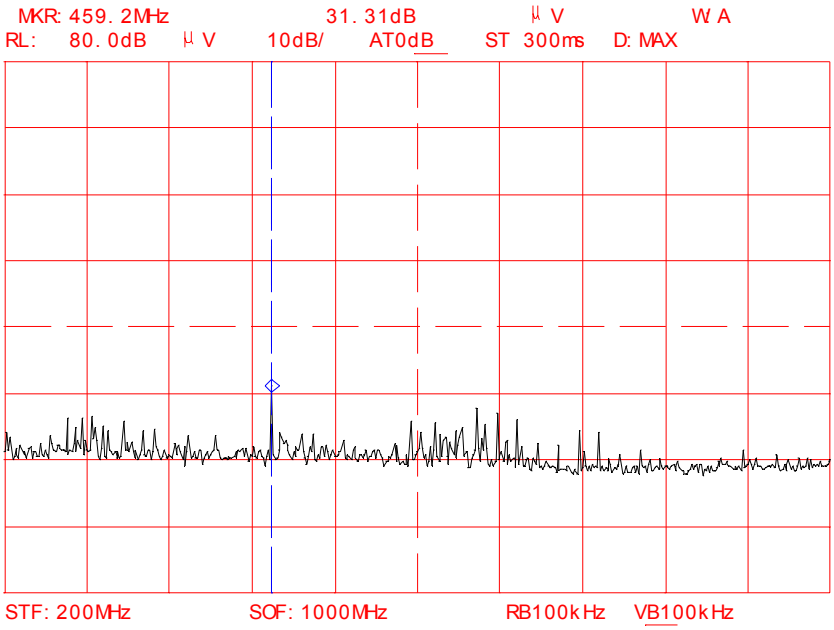
8.3.7 P4700 Vert Ant 100% Micro 100% Fan 30-230 MHz Peak



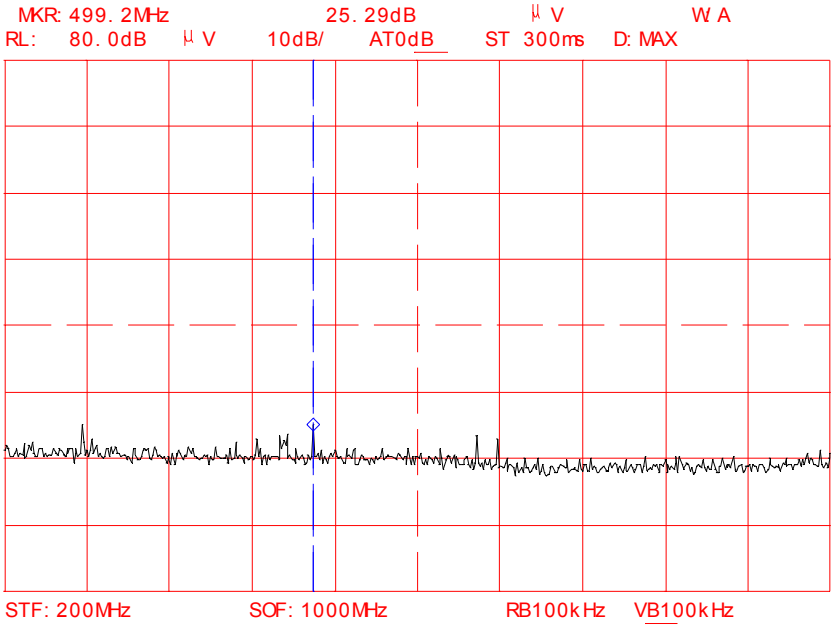
8.3.8 P4700 Horz Ant 100% Micro 100% Fan 30-230 MHz Peak



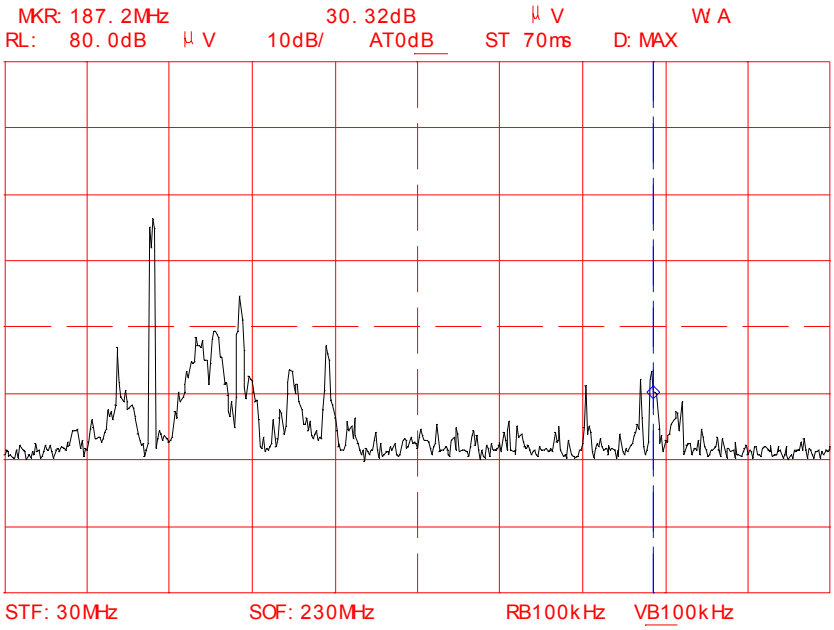
8.3.9 P4700 Vert Ant 100% Micro 100% Fan 200-1000 MHz Peak



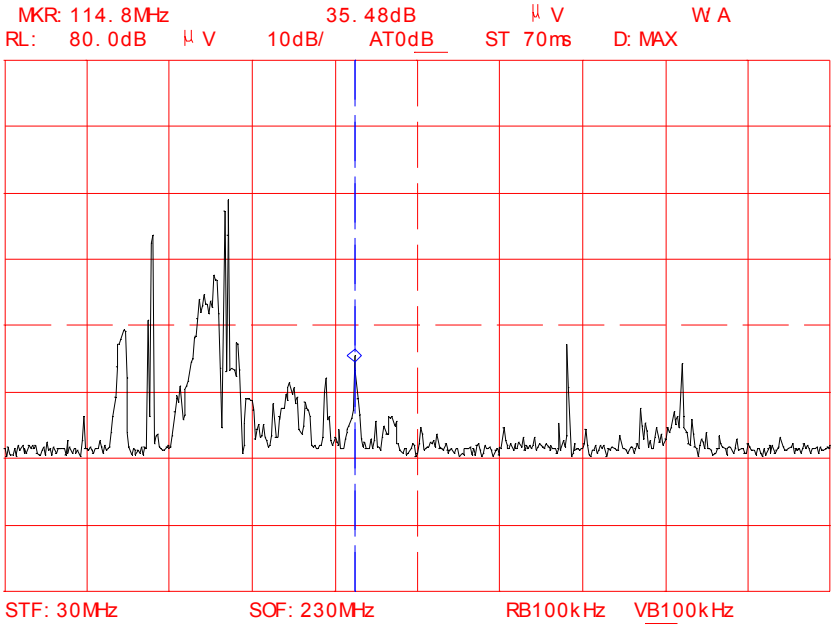
8.3.10 P4700 Horz Ant 100% Micro 100% Fan 200-1000 MHz Peak



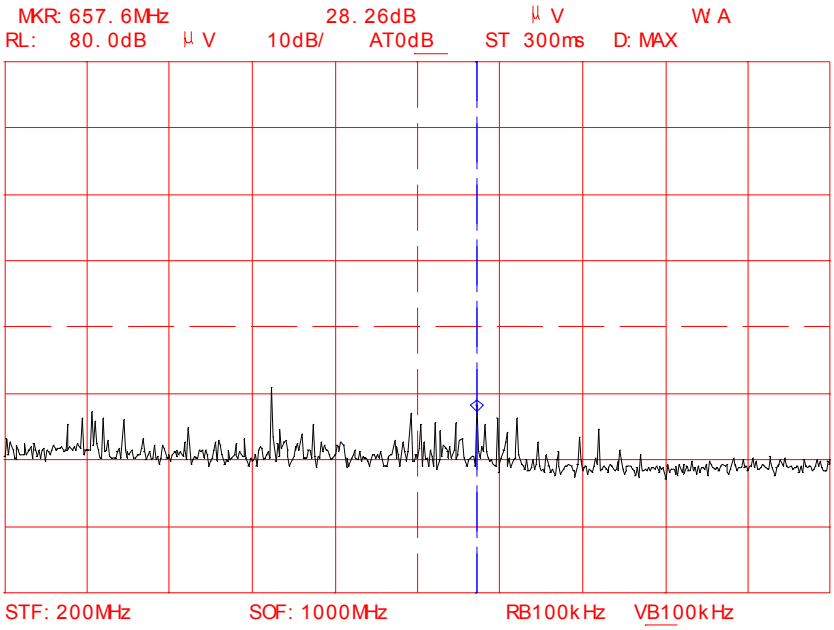
8.3.11 P4700 Vert Ant 50% Micro 50% Fan 30-230 MHz Peak



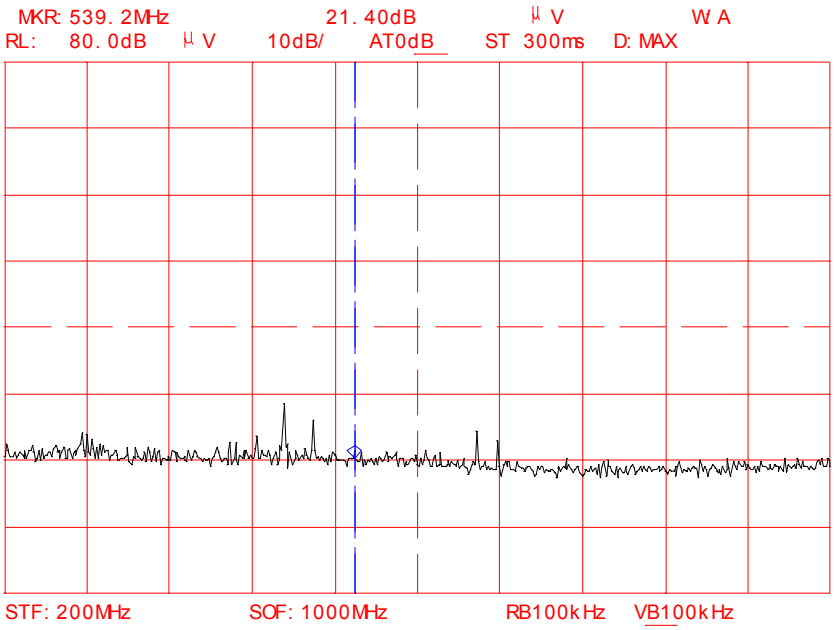
8.3.12 P4700 Horz Ant 50% Micro 50% Fan 30-230 MHz Peak



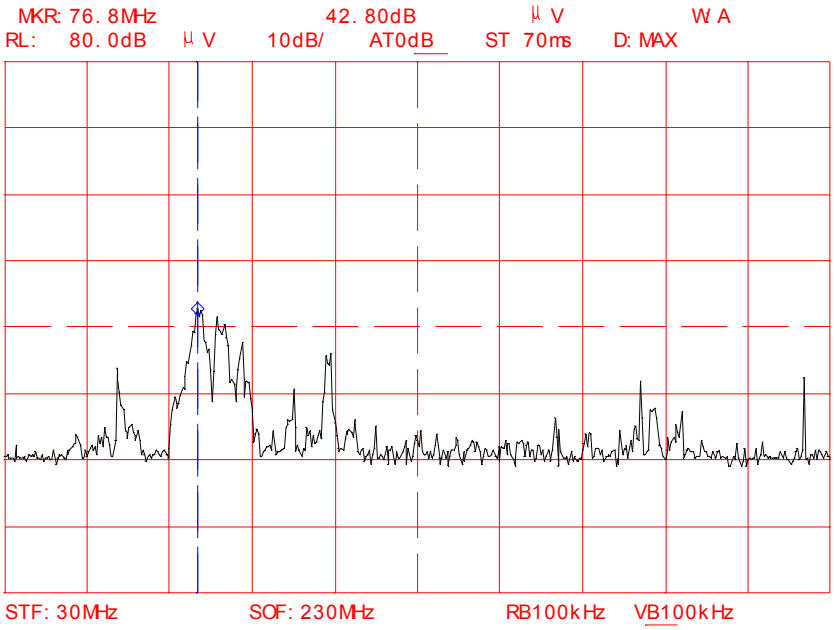
8.3.13 P4700 Vert Ant 50% Micro 50% Fan 30-230 MHz Peak



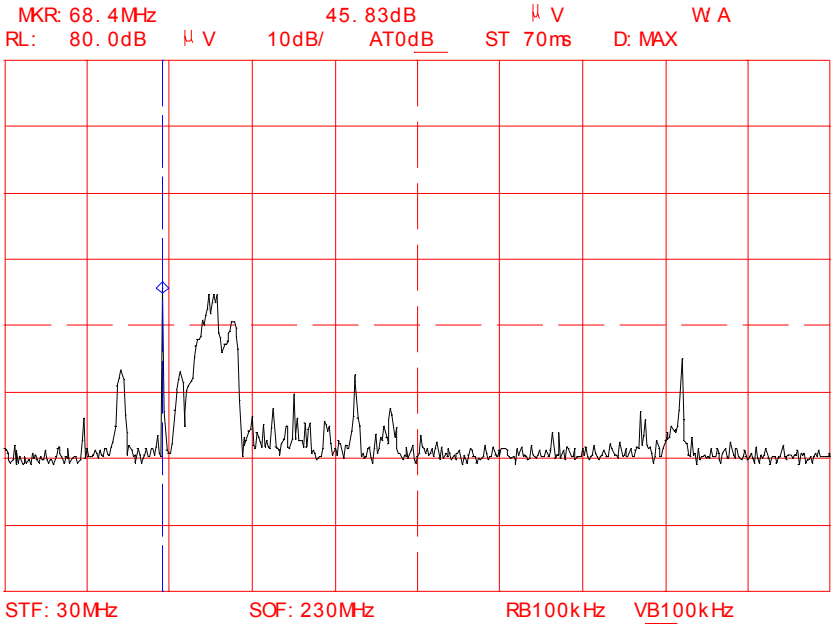
8.3.14 P4700 Horz Ant 50% Micro 50% Fan 30-230 MHz Peak



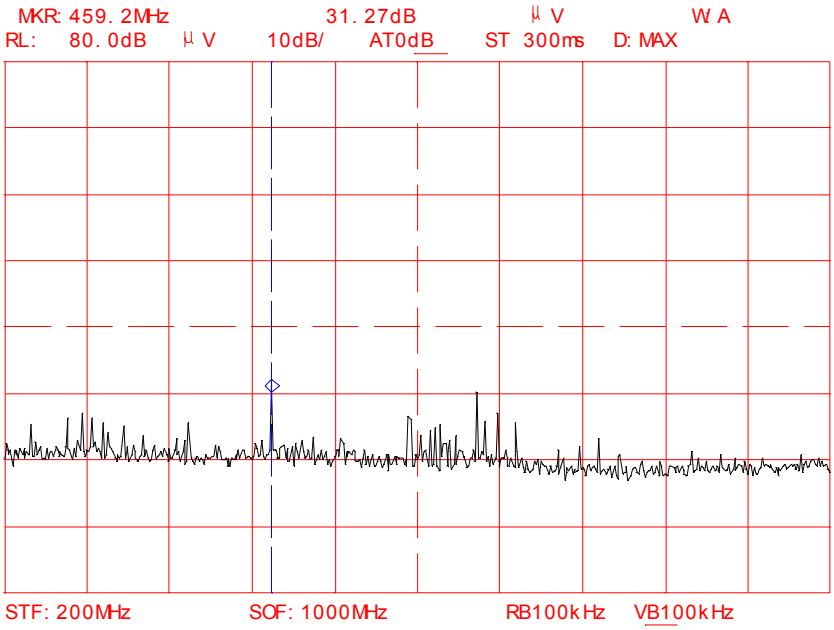
8.3.15 P4700 Vert Ant Heater On 50% Micro 50% Fan 30-230 MHz Peak



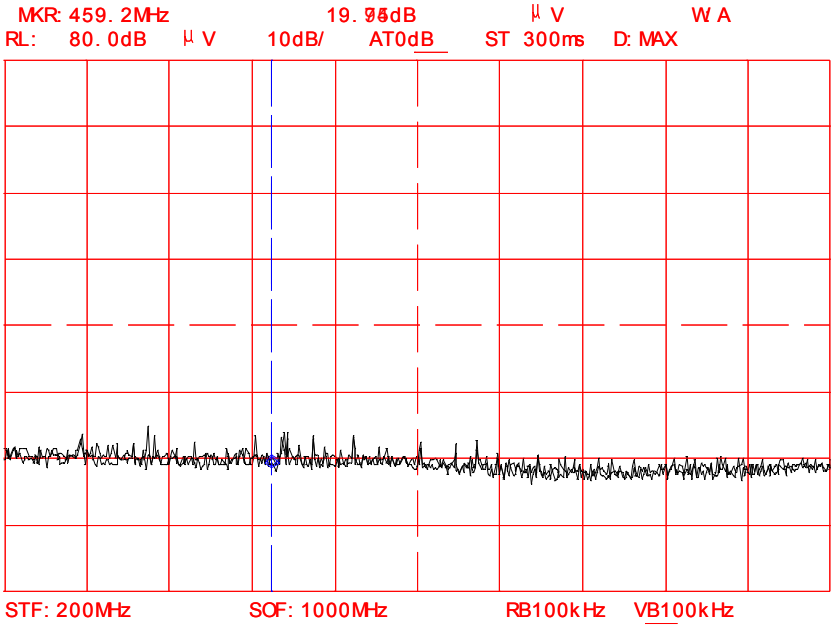
8.3.16 P4700 Horz Ant Heater On 50% Micro 50% Fan 30-230 MHz Peak



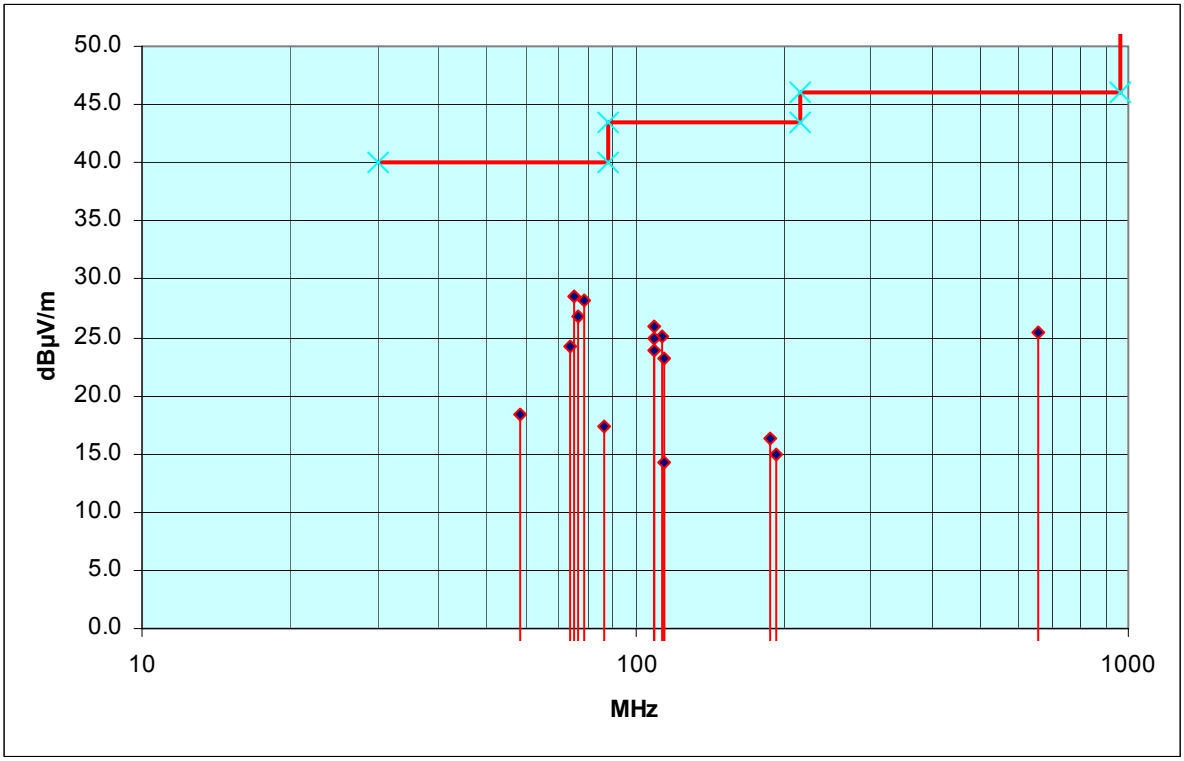
8.3.17 P4700 Vert Ant Heater On 50% Micro 50% Fan 200-1000 MHz Peak



8.3.18 P4700 Horz Ant Heater On 50% Micro 50% Fan 200-1000 MHz Peak



8.3.19 Test 3a - Radiated Emissions 3 meter OATS



8.3.20 Test 3a - Radiated Emissions, Data 3 meter OATS

Frequency MHz	Reading dBµV	Antenna Correction	Cable Correction	Horizontal Vertical	Antenna Height (m)	Turntable Position	Total dBµV/m	Pass Fail
Tests carried out with heaters on								
109	11.0	10.5	2.4	Vertical	1	0	23.9	Pass
109.2	13.0	10.5	2.4	Vertical	1	0	25.9	Pass
113	12.0	10.7	2.4	Vertical	1	0	25.1	Pass
115	10.0	10.8	2.5	Vertical	1	0	23.3	Pass
193.7	4.0	8.5	2.5	Vertical	1	0	15.0	Pass
Tests carried out with micro wave on full power fan on 100%								
58.4	11.0	5.2	2.1	Vertical	1	0	18.3	Pass
73.7	16.0	6.1	2.2	Vertical	1	0	24.3	Pass
74.9	20.0	6.3	2.2	Vertical	1	0	28.5	Pass
76.7	18.0	6.5	2.2	Vertical	1	0	26.7	Pass
79	19.0	6.9	2.2	Vertical	1	0	28.1	Pass
86.4	7.0	8.1	2.3	Vertical	1	0	17.4	Pass
109.4	12.0	10.5	2.4	Vertical	1	0	24.9	Pass
114.5	1.0	10.8	2.5	Vertical	1	0	14.3	Pass
187.2	5.0	8.2	3.1	Vertical	1	0	16.3	Pass
657.2	-1.0	20.3	6.2	Vertical	4	0	25.5	Pass

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

Radiated emissions over the frequency range 1 GHz to 25 GHz were recorded 1 m & 3 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 100% and preset settings and microwave set at 100% 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 low loss borosilicate containers was placed in the centre and right hand corner of the EUT during testing of the microwave function as required by MP-5. From paragraph 8.4.3 – 8.4.18, it can be seen that emissions were recorded

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 paragraph.3, set-up diagram and photograph in paragraph 8.4.2

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

Where required 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.

When the EUT was taken to the OATS, emissions were detected and measured; 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.

From the figures and table 8.4.19 – 8.4.20, it can be seen that the radiated emissions were found to be within the requirements of the calculated limits:

Limit = 25 µV/m @ 300 m for 500 W
Limit = 72.67 dBµV/m @ 3 m for a calculated power of 1.483 kW

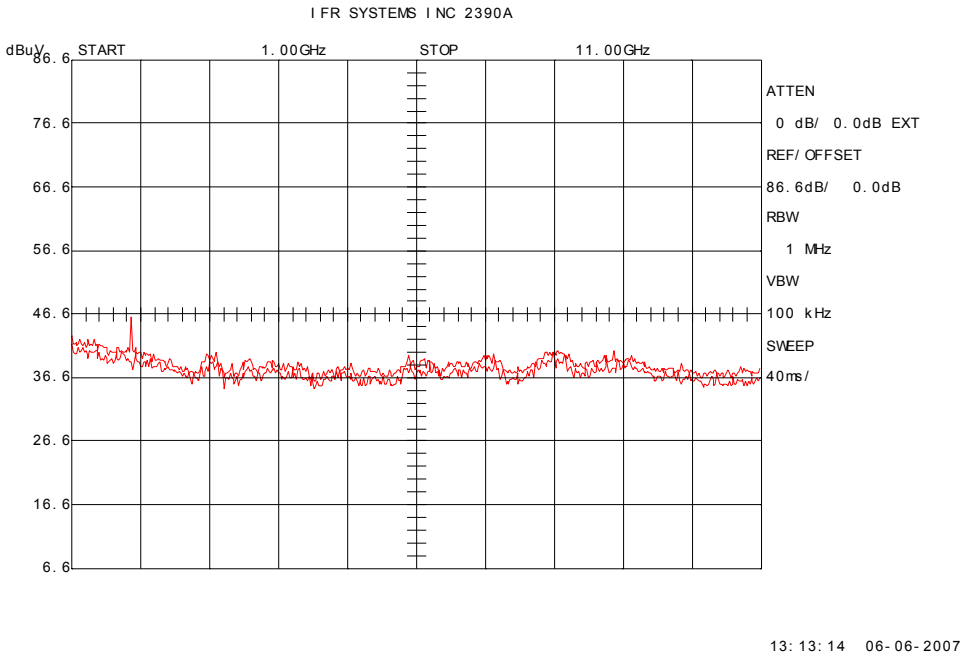
8.4.1 Test 3b- Test Equipment Used

The following major items of test equipment were used tests:

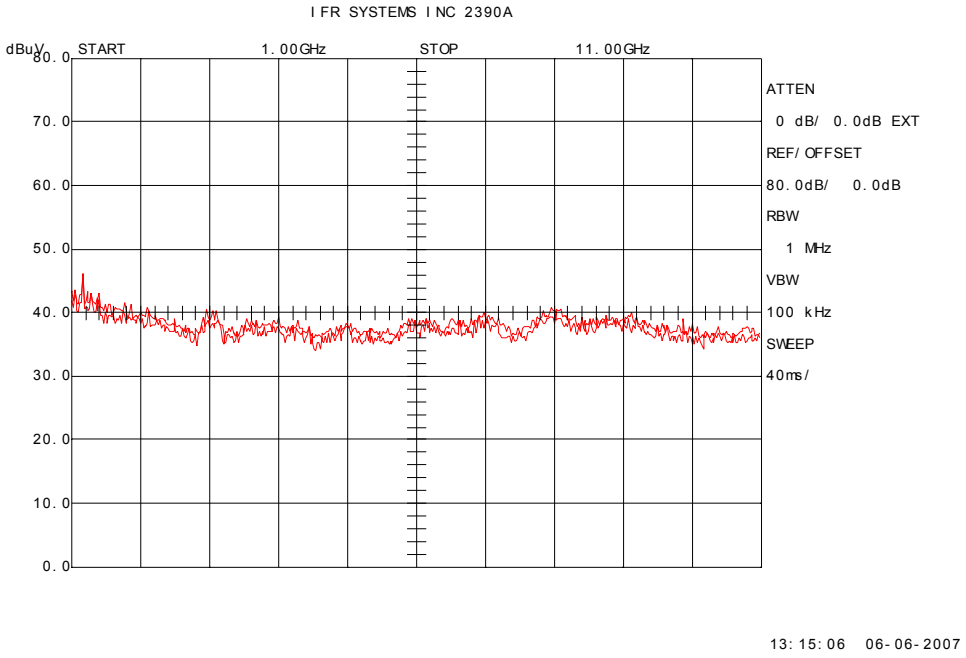
OATS measurements		DRGFS	EMCO	PA5	TC13	SA10	TRL	OATS 2	
Pre-Scans		DRGFS	EMCO	PA5	TC13	SA10	TRL	Room 1	Room 4

8.4.2 Test 3b - Set-up Photographs

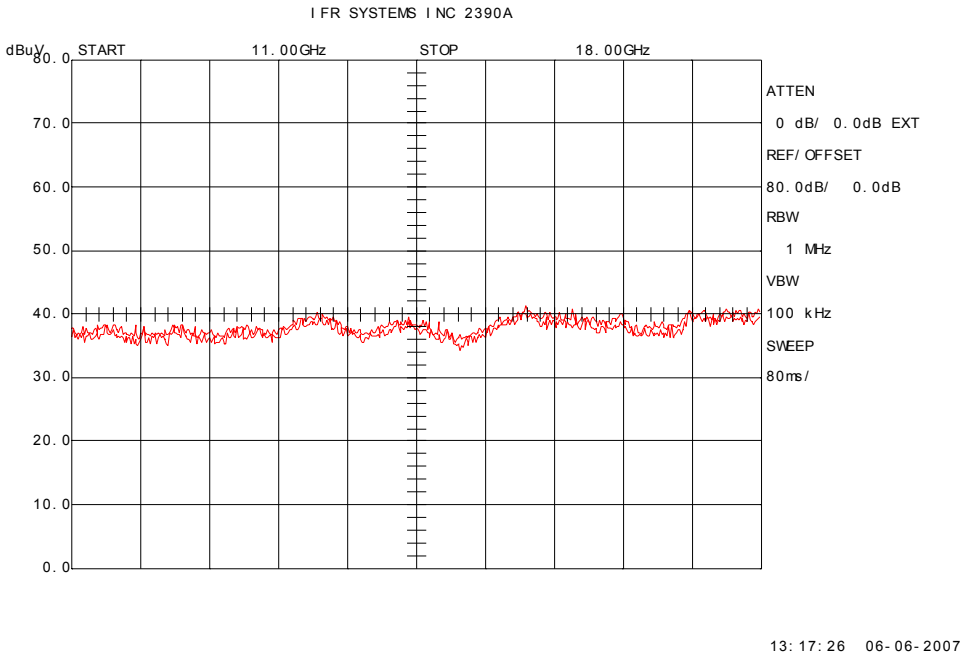
8.4.3 P4700 Vert Ant Heaters On Pre Heat 1-11 GHz Pre Heat Peak PA5



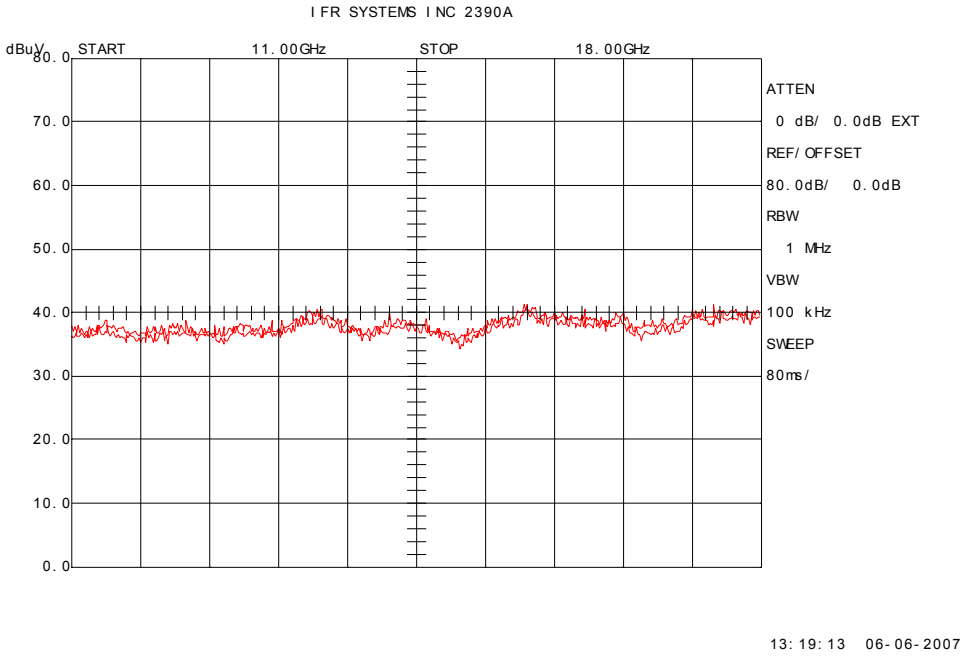
8.4.4 P4700 Horz Ant Heaters On Pre Heat 1-11 GHz Pre Heat Peak PA5



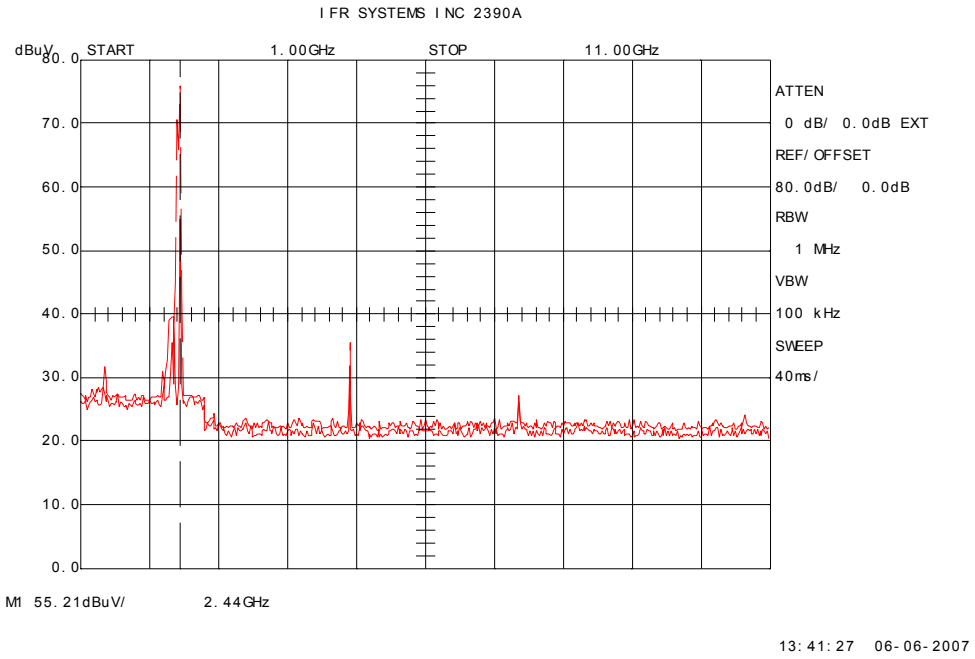
8.4.5 P4700 Vert Ant Heaters On Pre Heat 11-18 GHz Pre Heat Peak PA5



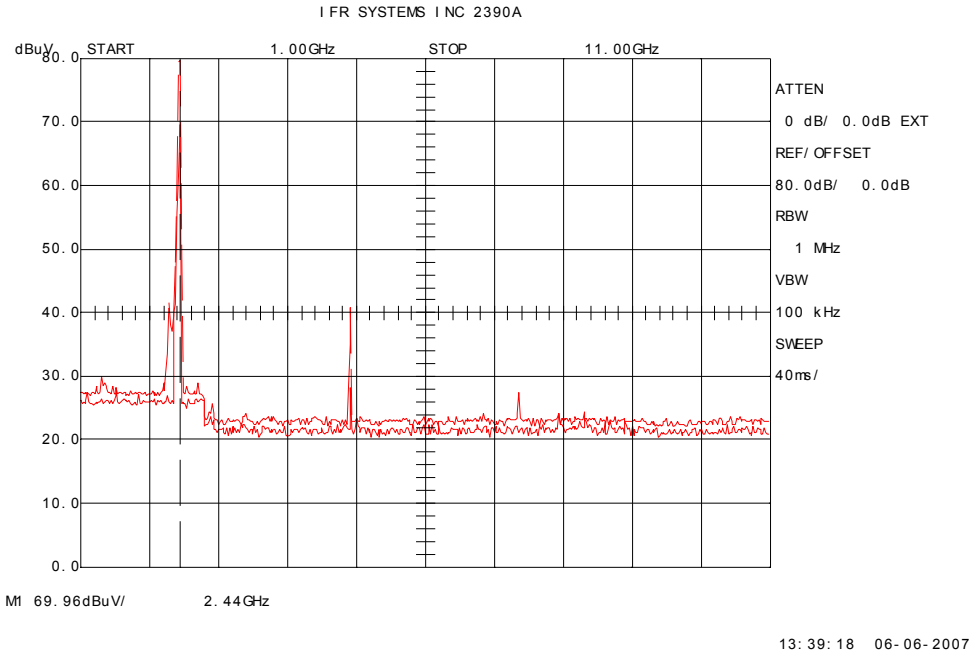
8.4.6 P4700 Horz Ant Heaters On Pre Heat 11-18 GHz Pre Heat Peak PA5



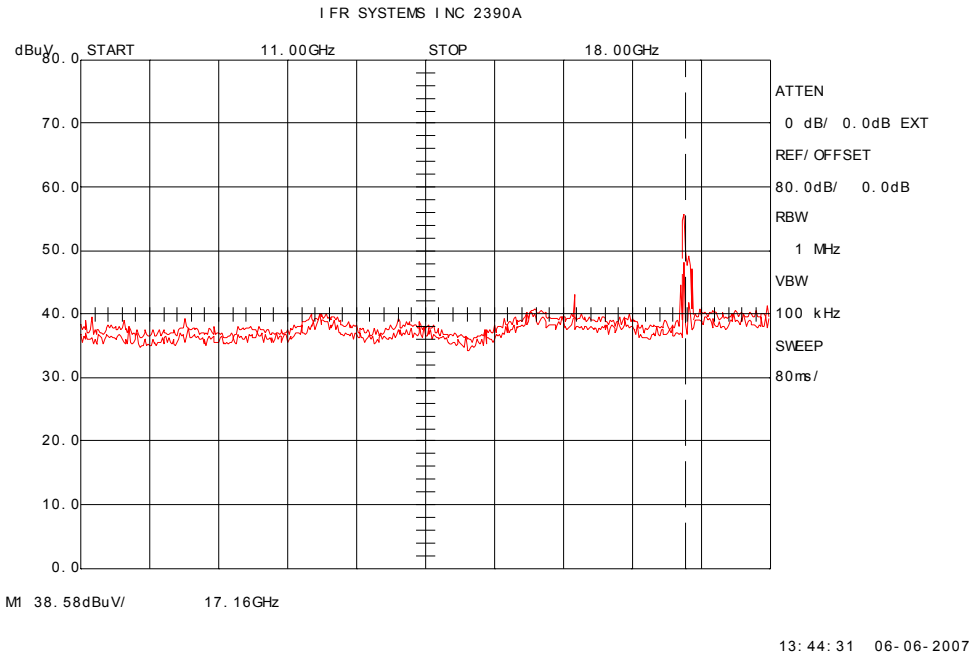
8.4.7 P4700 Vert Ant 100% Micro 100% Fan 1-11 GHz Peak



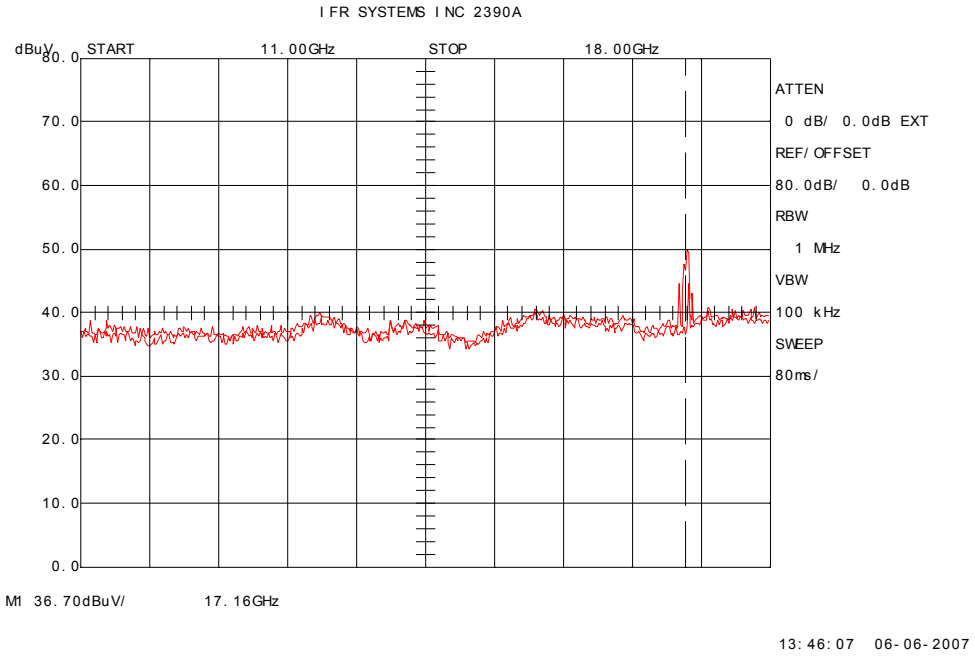
8.4.8 P4700 Horz Ant 100% Micro 100% Fan 1-11 GHz Peak



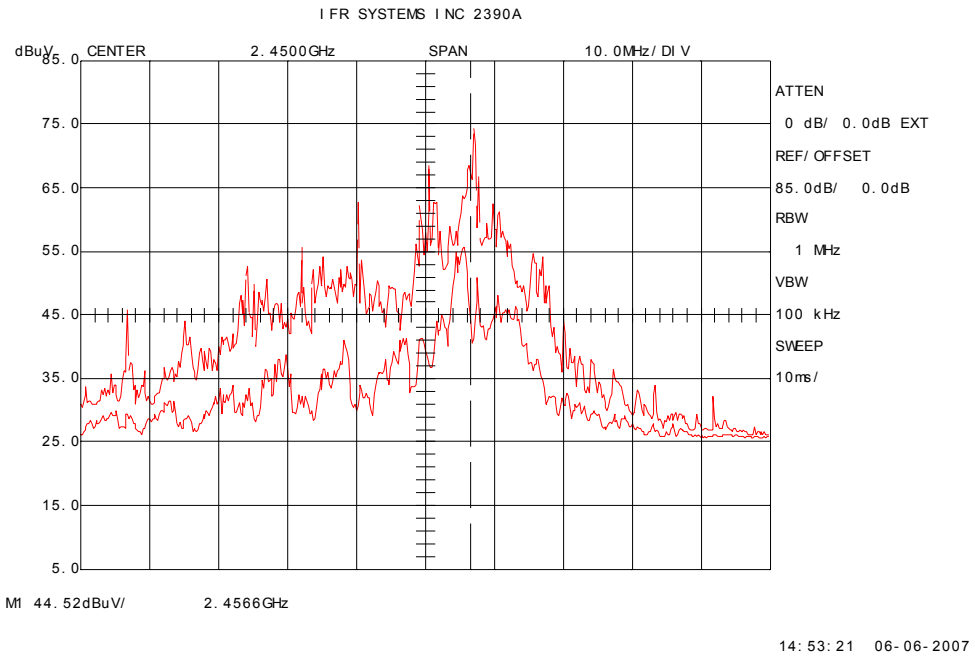
8.4.9 P4700 Vert Ant 100% Micro 100% Fan 11-18 GHz Peak PA5



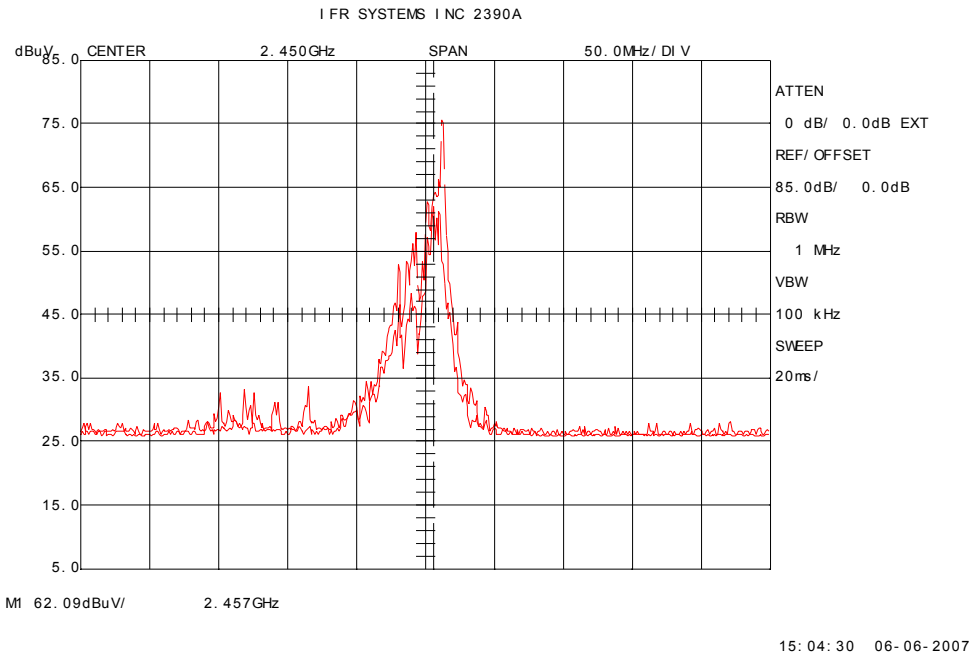
8.4.10 P4700 Horz Ant 100% Micro 100% Fan 11-18 GHz Peak PA5



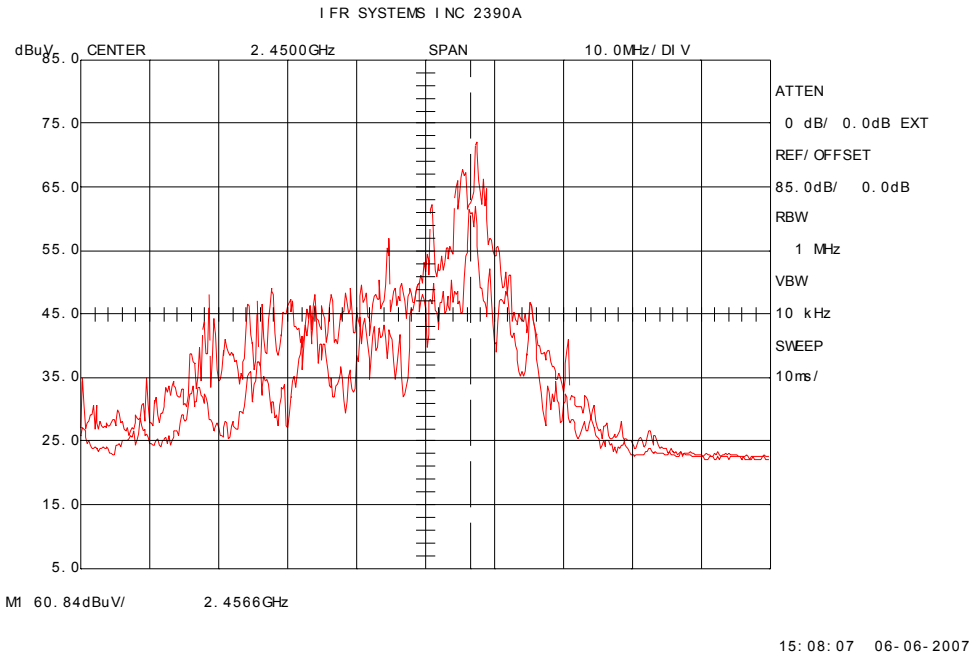
8.4.11 P4700 Horz Ant 2.45 GHz 100% Micro 100% Fan 100 MHz Avg



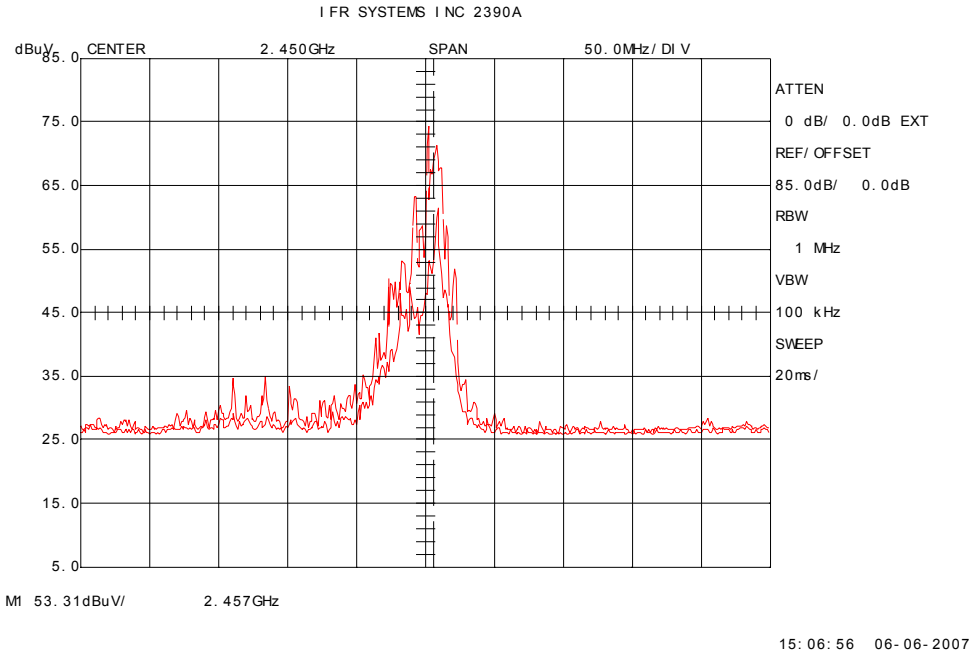
8.4.12 P4700 Horz Ant 2.45 GHz 100% Micro 100% Fan 500 MHz Avg



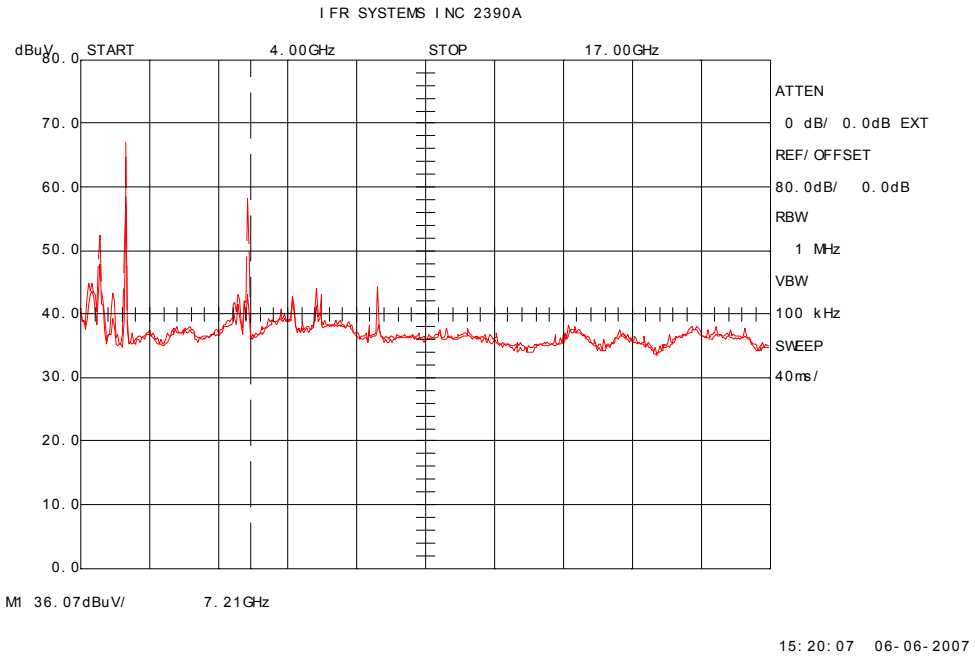
8.4.13 P4700 Vert Ant 2.45 GHz 100% Micro 100% Fan 500 MHz Avg



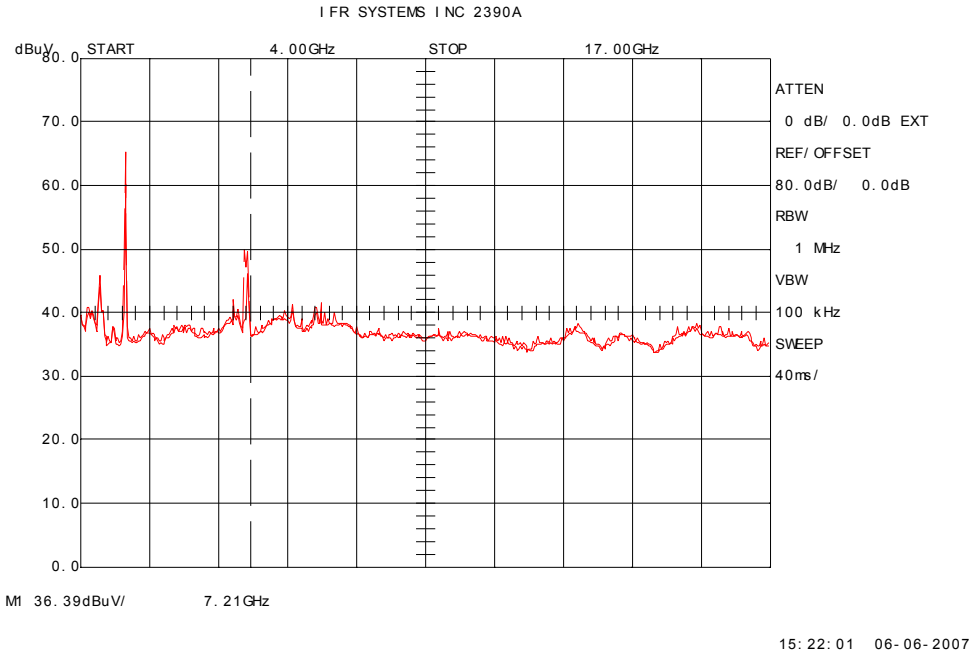
8.4.14 P4700 Vert Ant 2.45 GHz 100% Micro 100% Fan 500 MHz Avg



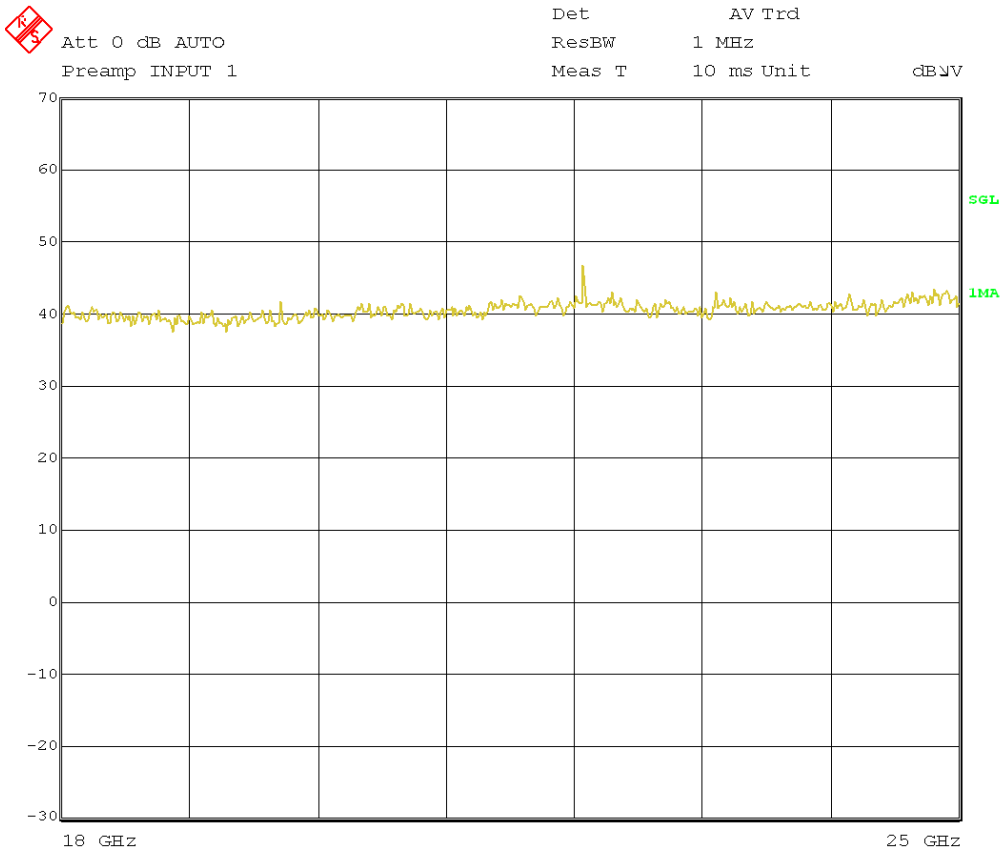
8.4.15 P4700 Vert Ant 100% Micro 100% Fan 4-18 GHz Avg PA5



8.4.16 P4700 Horz Ant 100% Micro 100% Fan 4-18 GHz Avg PA5

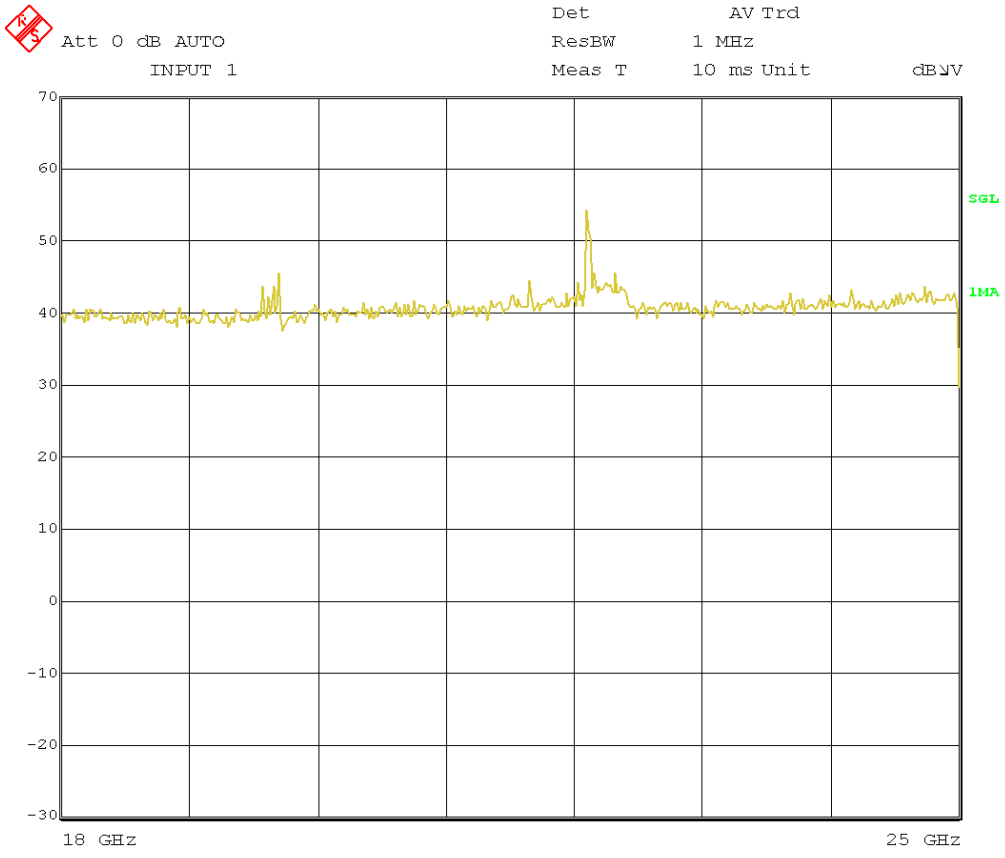


8.4.17 P4700 Horz Ant 100% Micro 100% Fan 18-25 GHz PA5 Pk 1.4lt



Date: 14.JUN.2007 16:19:03

8.4.18 P4700 Vert Ant 100% Micro 100% Fan 18-25 GHz PA5 Pk 1.4lt



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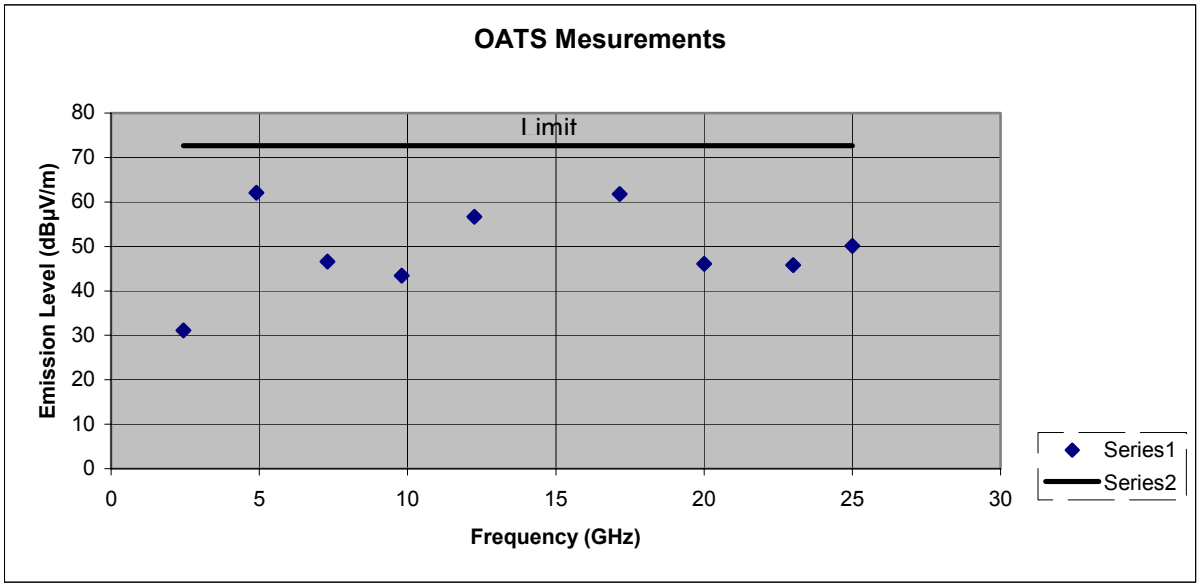
8.4.19 Test 3b – 208V - Radiated Emissions Corrected



8.4.20 Test 3b - Radiated Emissions 3 meter OATs, Data Average Detector

Freq	Total	Limit	Reading	Antenna	Pre Amp &	Antenna
GHz	dBµV/m	dBµV/m	dBµV/m	Correction	Cable Correction	
2.44	31.1	72.67	35	28.5	32.4	DRGFS
4.9	62.1	72.67	61	32.4	31.3	DRGFS
7.3	46.6	72.67	42	35.8	31.2	DRGFS
9.8	43.4	72.67	36	38	30.6	DRGFS
12.25	56.7	72.67	46	39	28.3	DRGFS
17.15	61.8	72.67	46	41	25.2	DRGFS
20	46.1	72.67	30	45.1	29	EMCO
23	45.8	72.67	30	45.8	30	EMCO
25	50.15	72.67	31.25	48.9	30	EMCO

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

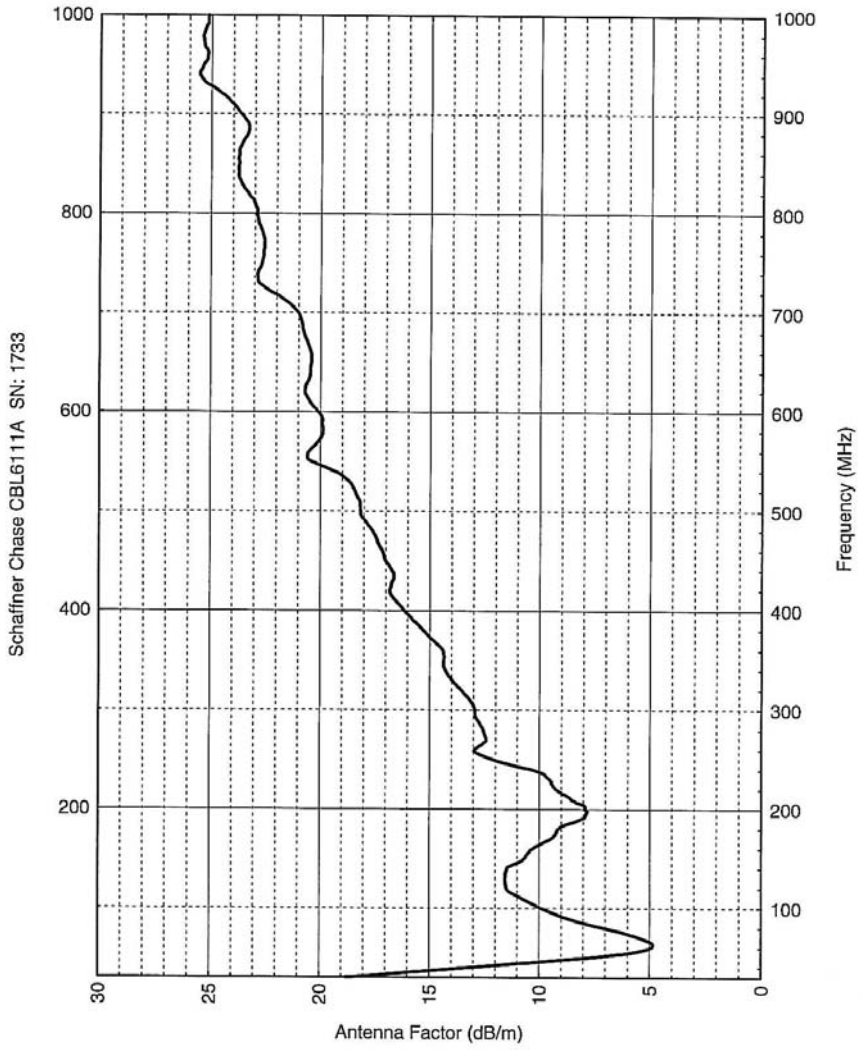
Plant No	Manufacturer	Description	Serial No	Cal Period	Cal Due
BA3	Chase	Bilog Antenna,CBL6111A	1733	24 Months	04 Oct 08
BA4	Chase	Bilog Antenna,CBL6111A	1667	24 Months	N/A
DL50/3	RS components	50W Load	613-690	12 Months	15 Nov 07
DRGFS	EMCO	3115 Double Ridge Guide	9701-5093	60 Months	02 Jan 08
EMCO	EMCO	3116 Double Ridge Guide	2103	12 months	29 Sept 07
L1/1	EMC Projects Ltd.	CISPR16 9kHz-30MHz (30A,50 /50µH), MIL STD 461D		12 Months	27 Apr 08
L1/2	EMC Projects Ltd.	CISPR16 9kHz-30MHz (30A,50 /50µH), MIL STD 461D		12 Months	27 Apr 08
L1/3	EMC Projects Ltd.	CISPR16 9kHz-30MHz (30A,50 /50µH), MIL STD 461D		12 Months	27 Apr 08
LHR	Chase	Receiver LHR7000	1028	12 Months	03 Apr 08
OTS2	EMC Projects Ltd.	Open test site 2		12 Months	29 May 08
OTS2/1	EMC Projects Ltd.	Installed Receive Coax Cable on OATS2		12 Months	29 May 08
OTS2/2	EMC Projects Ltd.	Installed Receive Coax Cable on OATS2		12 Months	29 May 08
PA2	EMC Projects Ltd.	HF Pre Amplifier	001	12 Months	26 July 07
PA5	Hewlett Packard.	8449B Pre Amplifier	3008A00176	24 Months	29 Jan 08
Room1	Ray Proof	Screen room 3.7m x 5m x3m	1662	12 Months	23 Apr 08
Room 4	Belling Lee	Screened Room 3m x 6m x 7m		12 Months	23 Apr 08
RX12	Rhode & Schwarz	Receiver EMI	838494/012	12 Months	07 July 07
RX14	Rhode & Schwarz	Receiver ESMI	839013/003	12 Months	07 July 07
SA9	Anritsu	Spectrum Analyser MS2601B	MT54360	12 Months	11 Oct 08
TC13	Reynolds	Cable Assembly 3 meters		12 Months	N/A
TP1	RS components	RS1319 Temperature Indicator	061104110	12 Months	09 May 08
TRL	Rhode & Schwarz	Receiver ESIB 40	110241	12 Months	01 July 07

11 ANNEX B - CORRECTION FACTORS

11.1 Antenna Correction Factors BA3 30-1000 MHz

NATIONAL PHYSICAL LABORATORY
Continuation Sheet

Figure 1
Antenna Factor (dB/m), Free Space
Antenna factor for antenna Schaffner Chase CBL6111A, s/n 1733.



Reference : E06070501/1
Date of Issue : 5 October 2006
Checked by :

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NPL-A01-94/1

11.2 Antenna Correction Factors DRGFS 1-18 GHz

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

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Checked by: 

11.3 Antenna Correction Factors DRGFS 18-40 GHz

Aeroflex International Ltd
Longacres House, Six Hills Way
Stevenage, Herts
England, SG1 2AN
Tel: +44 (0) 1438 742200
Fax: +44 (0) 1438 772203

Certificate Of Calibration

MANUFACTURER	: EMCO	Type No	: 3116	SERIAL No	: 8903-2103
DESCRIPTION	: Double Ridged Guide Antenna			REF No	: 787009

Table 1 – Antenna Performance At A Distance Of 1 Metre

Frequency (GHz)	Antenna Factor (dB/m)	Isotropic Gain (dBi)	Numeric Gain (-)
18.0	47.1	8.2	6.6
18.2	47.0	8.5	7.0
18.4	46.7	8.8	7.6
18.6	46.4	9.2	8.4
18.8	46.1	9.6	9.1
19.0	45.9	9.9	9.8
19.2	45.7	10.2	10.5
19.4	45.6	10.5	11.2
19.6	45.3	10.8	12.0
19.8	45.0	11.1	12.9
20.0	44.8	11.4	13.8
20.2	44.7	11.6	14.5
20.4	44.7	11.7	14.9
20.6	44.7	11.8	15.0
20.8	44.8	11.8	15.1
21.0	44.9	11.8	15.1
21.2	44.9	11.8	15.3
21.4	44.9	11.9	15.5
21.6	44.9	12.0	15.7
21.8	45.0	12.0	15.8
22.0	45.1	11.9	15.6
22.2	45.3	11.8	15.2
22.4	45.5	11.7	14.7
22.6	45.7	11.6	14.4
22.8	45.8	11.6	14.4
23.0	45.8	11.6	14.6
23.2	45.8	11.7	14.8
23.4	45.8	11.8	15.0
23.6	45.8	11.8	15.3
23.8	45.9	11.9	15.4
24.0	45.9	11.9	15.5
24.2	46.1	11.8	15.2
24.4	46.3	11.7	14.6
24.6	46.6	11.5	14.0
24.8	46.8	11.3	13.6
25.0	46.9	11.3	13.5
25.2	46.8	11.4	13.8
25.4	46.8	11.5	14.1
25.6	46.9	11.5	14.2
25.8	46.9	11.5	14.2
26.0	47.0	11.5	14.0
26.2	47.2	11.4	13.8
26.4	47.3	11.4	13.7
26.6	47.2	11.5	14.1
26.8	47.1	11.6	14.6
27.0	47.1	11.7	15.0
27.2	47.2	11.7	14.9
27.4	47.3	11.6	14.6
27.6	47.5	11.5	14.2
27.8	47.6	11.5	14.0
28.0	47.7	11.5	14.1
28.2	47.6	11.6	14.4
28.4	47.6	11.7	14.6
28.6	47.6	11.7	14.8
28.8	47.7	11.7	14.9
29.0	47.7	11.7	14.9
29.2	47.8	11.8	15.0
29.4	47.7	11.8	15.3
29.6	47.6	12.0	15.9
29.8	47.5	12.2	16.7
30.0	47.4	12.4	17.3
30.2	47.4	12.5	17.6
30.4	47.4	12.4	17.6
30.6	47.5	12.4	17.4
30.8	47.6	12.4	17.2
31.0	47.7	12.3	17.0
31.2	47.9	12.2	16.7
31.4	48.0	12.1	16.2
31.6	48.3	11.9	15.5
31.8	48.6	11.6	14.6
32.0	49.0	11.3	13.5
32.2	49.4	10.9	12.4
32.4	49.8	10.6	11.5
32.6	50.0	10.4	11.0
32.8	50.3	10.3	10.7
33.0	50.5	10.1	10.3
33.2	50.7	9.9	9.9
33.4	50.9	9.8	9.5
33.6	51.1	9.6	9.1
33.8	51.2	9.6	9.0
34.0	51.1	9.7	9.3
34.2	50.9	10.0	9.9
34.4	50.6	10.3	10.8
34.6	50.3	10.7	11.7
34.8	50.0	11.1	12.8
35.0	49.6	11.5	14.2
35.2	49.1	12.0	15.9
35.4	48.7	12.5	17.7
35.6	48.4	12.9	19.4
35.8	48.0	13.2	21.1
36.0	47.7	13.6	22.8
36.2	47.4	13.9	24.8
36.4	47.2	14.3	26.7
36.6	46.9	14.6	28.7
36.8	46.7	14.9	30.6
37.0	46.4	15.1	32.7
37.2	46.2	15.4	34.8
37.4	46.0	15.7	37.0
37.6	45.8	15.9	39.2
37.8	45.6	16.1	41.1
38.0	45.5	16.3	42.3
38.2	45.6	16.3	42.5
38.4	45.7	16.2	41.5
38.6	46.0	15.9	39.1
38.8	46.5	15.5	35.7
39.0	47.0	15.0	32.0
39.2	47.5	14.5	28.4
39.4	48.1	14.0	25.1
39.6	48.8	13.4	21.9
39.8	49.5	12.7	18.8
40.0	50.2	12.0	16.0

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