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## **REPORT ON**

Limited FCC CFR 47: Parts 15, 22 and 24 Testing in support of an  
Application for Grant of Equipment Authorisation  
of a HcHc Base Transceiver Station Cabinet

### **COMMERCIAL-IN-CONFIDENCE**

FCC IDs:  
L7KWTF A-01 (WTFA GSM 800 Transceiver)  
L7KWTP A-01 (WTPA GSM 1900 Transceiver)

Report No OR613648/01 Issue 1

February 2005

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**PREPARED FOR**

Nokia Networks UK Limited

**PREPARED BY**

  
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EMC Engineer

**APPROVED BY**

  
R F Clements  
EMC Signatory

**DATED**

23<sup>rd</sup> February 2005

**DISTRIBUTION**

Nokia Networks UK Limited

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TÜV Product Service

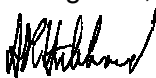
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**ENGINEERING STATEMENT**

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47: Parts 15, 22 and 24. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer;



A R Hubbard



G Lawler





## CONTENTS

Section	Page No
<b>1</b>	<b>REPORT SUMMARY</b>
1.1	Status..... 4
1.2	Introduction or Test and Assessment Schedule..... 5
1.3	Brief Summary of Results (and Observations)..... 6
1.4	Product information ..... 7
1.5	Test Conditions (Configuration)..... 9
1.6	Deviations from the Standard..... 9
1.7	Modification Record..... 9
<b>2</b>	<b>TEST DETAILS – Part 15</b>
2.1	Radiated Emissions..... 11
<b>3</b>	<b>TEST DETAILS – Part 22</b>
3.1	Radiated Emissions..... 15
<b>4</b>	<b>TEST DETAILS – Part 24</b>
4.1	Radiated Emissions..... 19
<b>5</b>	<b>TEST EQUIPMENT USED</b>
5.1	Table of Test Equipment Used..... 23
5.2	Measurement Uncertainty ..... 24
<b>6</b>	<b>EUT PHOTOGRAPHS</b>
6.1	List of EUT Photographs ..... 26
<b>7</b>	<b>ACCREDITATION, DISCLAIMERS AND COPYRIGHT</b>
7.1	Accreditation, Disclaimers and Copyright ..... 30
	<b>APPENDICES</b>
A	Titchfield FCC Site Compliance Letter ..... 32



## **SECTION 1**

### **REPORT SUMMARY**

Limited FCC CFR 47: Parts 15, 22 and 24 Testing in support of an  
Application for Grant of Equipment Authorisation of a  
HcHc Base Transceiver Station Cabinet



## 1.1 STATUS

EQUIPMENT UNDER TEST	HcHc Base Transceiver Station Cabinet
OBJECTIVE	To undertake measurements to determine the Equipment Under Test's (EUT's) compliance with the specification.
NAME AND ADDRESS OF CLIENT	Nokia Networks UK Limited Nokia House Summit Avenue Southwood Farnborough Hampshire GU14 0NG
MODEL NUMBER	HcHc
TEST SPECIFICATION / ISSUE / DATE	FCC CFR 47: Part 15, Subparts B and C, October 2003 FCC CFR 47: Part 22, Subpart H, October 2003 FCC CFR 47: Part 24, Subpart D, October 2003
NUMBER OF ITEMS TESTED	One
SECURITY CLASSIFICATION OF EUT	Commercial In Confidence
INCOMING RELEASE DATE	Declaration of Build Status 6 <sup>th</sup> January 2005
ORDER NUMBER DATE	B90-9047277 16 <sup>th</sup> December 2004
START OF TEST FINISH OF TEST	16 <sup>th</sup> December 2004 22 <sup>nd</sup> December 2004
RELATED DOCUMENTS	ANSI C63.4 2001. Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.  FCC Public Notice document (DA 00-705 released 30 March 2000)



## 1.2 INTRODUCTION

The information contained within this report is intended to show limited verification of compliance of the Nokia HcHc Base Transceiver Station to the requirements of FCC Specification Parts 15, 22 and 24.

### 1.2.1 DECLARATION OF BUILD STATUS

<b>Manufacturing Description</b>	Base Transceiver Station Cabinet housing 24 Transceivers placed in 6 Metrosite Units
<b>Model No</b>	HcHc
<b>Part No</b>	Detailed in Section 1.4.3 of this report
<b>Serial No</b>	Detailed in Section 1.4.3 of this report
<b>Build Status</b>	0 Series
<b>Manufacturer</b>	Nokia Networks UK Limited
<b>Country of origin</b>	UK
<b>UK Agent</b>	Nokia Networks UK Limited
<b>Signature</b>	A Parry
<b>Date</b>	6 <sup>th</sup> January 2005
<b>Serial No</b>	Y613648

BABT Product Service Limited formally certifies that the manufacturer's declaration as reproduced in this report, is a true and accurate record of the original received from the applicant.



### 1.3 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out is shown below.

Test	Spec Clause	Test Description	Result	Levels/Comments
2.1	15.109	Spurious Radiated Emissions	Pass	
	15.207	Conducted Emissions on Power Lines	N/A	DC Powered
3.1	22.917	Radiated Emissions	Pass	
4.1	24.238	Radiated Emissions	Pass	



## **1.4 PRODUCT INFORMATION**

### **1.4.1 Technical Description**

The Equipment Under Test (EUT) was a HcHc Base Transceiver Station, housing 24 Transceivers placed in 6 Metrosite Units. The Transceivers comprised 12 x GSM 1900 and 12 x GSM 800.

### **1.4.2 Modes of Operation**

Modes of operation of the EUT during testing were as follows:

Applicable emissions testing was carried out with the EUT transmitting at full power on all time slots on 12 GSM 1900 channels and 12 GSM 800 Channels.





## 1.4.3 Test Configuration

Unit Name	Version	Serial Number	Metrosite location in Cabinet	Transceiver location in Metrosite
Cabinet	No version but 1 <sup>st</sup> production 0 series	—	—	—
DC Filter GE Products OY	Type S-1448-165 100VDC 130A @ 70°C	0232 81270	—	—
Transceiver GSM 1900	WTPA 11	L6041491538 468231A..101	Top Left	Top Left
Transceiver GSM 1900	WTPA 11	L6041489898 468231A..101	Top Left	Top Right
Transceiver GSM 1900	WTPA 11	L6041489980 468231A..101	Top Left	Bottom Right
Transceiver GSM 1900	WTPA 11	L6041488748 468231A..101	Top Left	Bottom Left
Transceiver GSM 1900	WTPA 11	L6041491532 468231A..101	Top Middle	Top Left
Transceiver GSM 1900	WTPA 11	L6041489044 468231A..101	Top Middle	Top Right
Transceiver GSM 1900	WTPA 11	L6041490007 468231A..101	Top Middle	Bottom Right
Transceiver GSM 1900	WTPA 11	L6041491527 468231A..101	Top Middle	Bottom Left
Transceiver GSM 1900	WTPA 11	L6041491529 468231A..101	Bottom Left	Top Left
Transceiver GSM 1900	WTPA 11	L6041489907 468231A..101	Bottom Left	Top Right
Transceiver GSM 1900	WTPA 11	L6041489901 468231A..101	Bottom Left	Bottom Right
Transceiver GSM 1900	WTPA 11	L6041491528 468231A..101	Bottom Left	Bottom Left
Transceiver GSM 800	WTFA 11	L1040421017 468654A..101	Top Right	Top Left
Transceiver GSM 800	WTFA 11	L1040421027 468654A..101	Top Right	Top Right
Transceiver GSM 800	WTFA 11	L1040424444 468654A..101	Top Right	Bottom Right
Transceiver GSM 800	WTFA 11	L1040421014 468654A..101	Top Right	Bottom Left
Transceiver GSM 800	WTFA 11	L1040421026 468654A..101	Bottom Middle	Top Left
Transceiver GSM 800	WTFA 11	L1040424432 468654A..101	Bottom Middle	Top Right
Transceiver GSM 800	WTFA 11	L1040424431 468654A..101	Bottom Middle	Bottom Right
Transceiver GSM 800	WTFA 11	L1040421009 468654A..101	Bottom Middle	Bottom Left
Transceiver GSM 800	WTFA 11	L1040516016 468654A..101	Bottom Left	Top Left
Transceiver GSM 800	WTFA 11	L1040516021 468654A..101	Bottom Left	Top Right
Transceiver GSM 800	WTFA 11	L1040516018 468654A..101	Bottom Left	Bottom Right
Transceiver GSM 800	WTFA 11	L1040516032 468654A..101	Bottom Left	Bottom Left
Interface Unit	VIFA 12	IR043500454 46708..206	Top Left	—
Interface Unit	VIFA 12	IR043500513 46708..206	Top Middle	—
Interface Unit	VIFA 12	IR043500511 46708..206	Top Right	—
Interface Unit	VIFA 12	IR043500471 46708..206	Bottom Right	—
Interface Unit	VIFA 12	IR043500482 46708..206	Bottom Middle	—
Interface Unit	VIFA 12	IR043500480 46708..206	Bottom Left	—
MetroSite Chassis	HVMC 11	3J043300260 468383A..102	Top Left	—
MetroSite Chassis	HVMC 11	3J043400165 468383A..102	Top Middle	—
MetroSite Chassis	HVMC 11	3J043200048 468383A..102	Top Right	—
MetroSite Chassis	HVMC 11	3J043300202 468383A..102	Bottom Right	—
MetroSite Chassis	HVMC 11	3J043200435 468383A..102	Bottom Middle	—
MetroSite Chassis	HVMC 11	3J043300201 468383A..102	Bottom Left	—
Fan Unit	HVMF 11	L1004267359 4682638..102	Top Left	—
Fan Unit	HVMF 11	L1004628412 4682638..102	Top Middle	—
Fan Unit	HVMF 11	L1004626287 4682638..102	Top Right	—
Fan Unit	HVMF 11	L1004627913 4682638..102	Bottom Right	—
Fan Unit	HVMF 11	L1004626019 4682638..102	Bottom Middle	—
Fan Unit	HVMF 11	L1004628354 4682638..102	Bottom Left	—
Transmission Unit	VXTB 11	1M041030502 467611A..105	Top Left	—
Transmission Unit	VXTB 11	1M041030487 467611A..105	Bottom Left	—
Power Supply Unit	HVSC 11	L1024000101 469042A..101	Top Left	—
Power Supply Unit	HVSC 11	L1024000106 469042A..101	Top Middle	—
Power Supply Unit	HVSC 11	L1024000109 469042A..101	Top Right	—
Power Supply Unit	HVSC 11	L1024000107 469042A..101	Bottom Right	—
Power Supply Unit	HVSC 11	L1024000111 469042A..101	Bottom Middle	—
Power Supply Unit	HVSC 11	L1024000104 469042A..101	Bottom Left	—



**1.5 TEST CONDITIONS**

The EUT was set-up simulating a typical user installation on the Alternative Open Field Test Site identified in Appendix A and tested in accordance with the applicable specification.

For all tests, the HcHc Base Transceiver Station was powered by a 24V DC supply.

**1.6 DEVIATIONS FROM THE STANDARD**

Not Applicable

**1.7 MODIFICATION RECORD**

Not Applicable



## **SECTION 2**

### **TEST DETAILS**

Limited FCC CFR 47: Part 15 Testing in support of an  
Application for Grant of Equipment Authorisation of a  
HcHc Base Transceiver Station



## **2.1 SPURIOUS RADIATED EMISSIONS**

### **2.1.1 Specification Reference**

FCC CFR 47: Part 15 Subpart B, Section 15.109

### **2.1.2 Equipment Under Test**

HcHc Base Transceiver Station

### **2.1.3 Dates of Test**

16<sup>th</sup>, 21<sup>st</sup> and 22<sup>nd</sup> December 2004

### **2.1.4 Test Equipment Used**

The major items of test equipment used for the above tests are identified as “Section 2.1” within the Test Equipment Used table shown in Section 5.1.

### **2.1.5 Test Procedure**

Test Performed in accordance with ANSI C63.4.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT. The list of emissions was then confirmed or updated under Alternative Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

Emissions identified within the range 30MHz – 1GHz were then formally measured using a CISPR Quasi-Peak detector.

Emissions identified within the range 1GHz – 20GHz were then formally measured using Peak and Average Detectors, as appropriate.

The measurements were performed at a 3m distance unless otherwise stated.



### 2.1.6 Test Results

Equipment Designation: Unintentional Radiator.

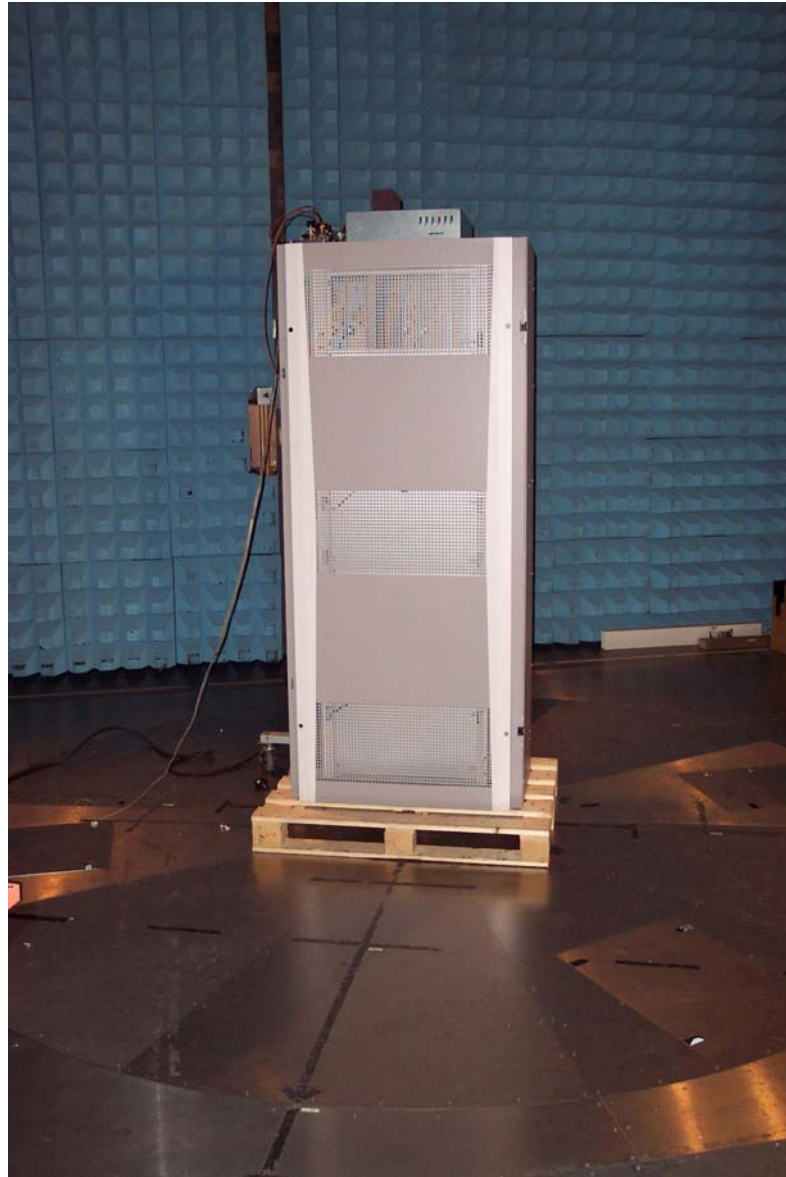
The EUT met the requirements of FCC CFR 47: Part 15 Subpart B, Section 15.109 for Spurious Radiated Emissions (30MHz – 20GHz).

The levels of the three highest emissions measured in accordance with the specification are presented below: -

Emission Frequency MHz	Polarisation Horizontal/ Vertical	Height cm	Azimuth degree	Field Strength		Limit	
				dB $\mu$ V/m	$\mu$ V/m	dB $\mu$ V/m	$\mu$ V/m
78.83	Vertical	100	201	13.6	4.8	40.0	100.0
80.25	Vertical	100	201	16.7	6.8	40.0	100.0
83.62	Vertical	100	201	15.4	5.9	40.0	100.0



2.1.7 Setup Photograph



Setup Photograph



### **SECTION 3**

#### **TEST DETAILS**

Limited FCC CFR 47: Part 22 Testing in support of an  
Application for Grant of Equipment Authorisation of a  
HcHc Base Transceiver Station



### **3.1 RADIATED EMISSIONS**

#### **3.1.1 Equipment Reference**

FCC CFR 47: Part 22 Subpart H, Section 22.917

#### **3.1.2 Equipment Under Test**

HcHc Base Transceiver Station

#### **3.1.3 Date of Test**

16<sup>th</sup>, 21<sup>st</sup> and 22<sup>nd</sup> December 2004

#### **3.1.4 Test Equipment Used**

The major items of test equipment used for the above tests are identified as "Section 3.1" within the Test Equipment Used table shown in Section 5.1.

#### **3.1.5 Test Procedure**

Test Performed in accordance with ANSI C63.4.

In order to determine the Radiated Emission Limits, measurements of transmitter power (P) were first carried out on the top, middle and bottom channels using a peak detector. The results are shown in the following table.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT. The list of emissions was then confirmed or updated under Alternative Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

Emissions identified within the range 30MHz – 1GHz were then formally measured using a CISPR Quasi-Peak detector.

Emissions identified within the range 1GHz – 20GHz were then formally measured using Peak and Average Detectors, as appropriate.

The measurements were performed at a 3m distance unless otherwise stated.





### 3.1.6 Test Results

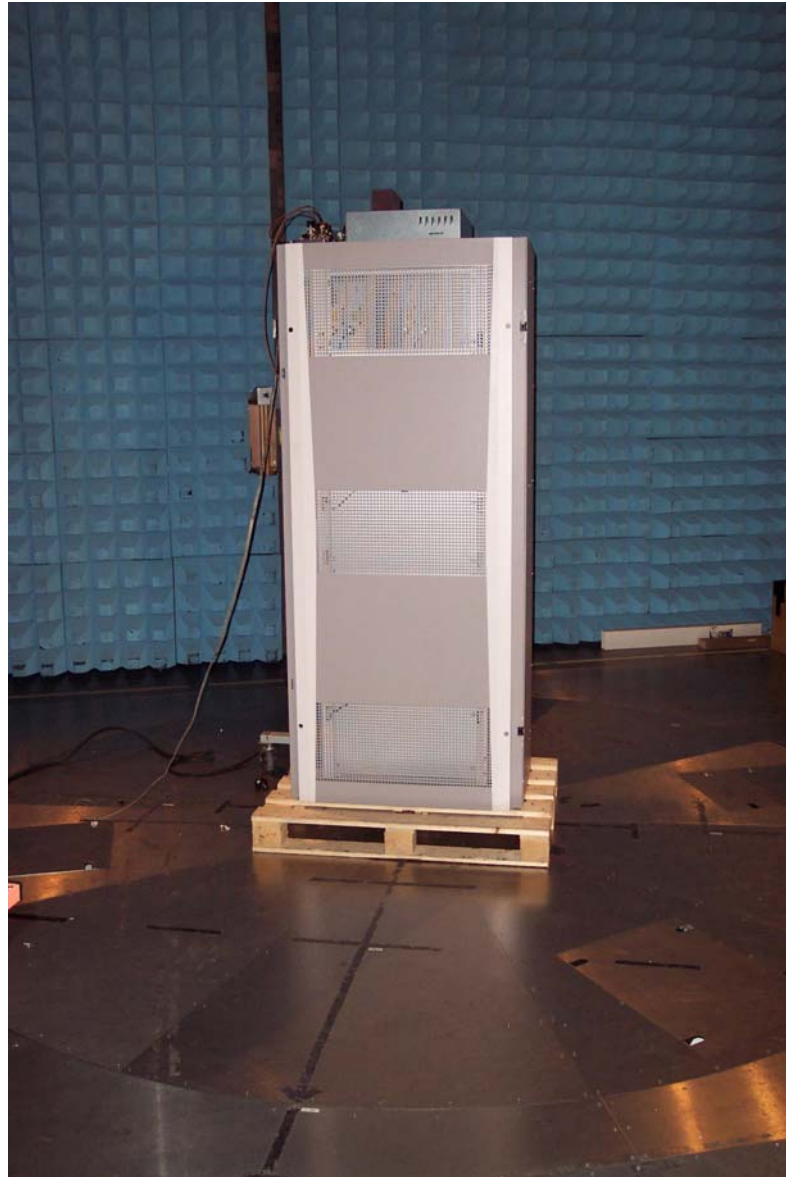
Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 22, Subpart H, 22.917 for Radiated Emissions (30MHz – 20GHz).

No EUT emissions were detected greater than the measurement system sensitivity which was at least 28dB below the limit.



3.1.7 Setup Photograph



Radiated Emissions Setup Photograph



## **SECTION 4**

### **TEST DETAILS**

Limited FCC CFR 47: Part 24 Testing in support of an  
Application for Grant of Equipment Authorisation of a  
HcHc Base Transceiver Station



## **4.1 RADIATED EMISSIONS**

### **4.1.1 Specification Reference**

FCC CFR 47: Part 24 Subpart E, Section 24.238

### **4.1.2 Equipment Under Test**

HcHc Base Transceiver Station

### **4.1.3 Date of Test**

16<sup>th</sup>, 21<sup>st</sup> and 22<sup>nd</sup> December 2004

### **4.1.4 Test Equipment Used**

The major items of test equipment used for the above tests are identified as "Section 4.1" within the Test Equipment Used table shown in Section 5.1.

### **4.1.5 Test Procedure**

Test Performed in accordance with ANSI C63.4.

In order to determine the Radiated Emission Limits, measurements of transmitter power (P) were first carried out on the top and bottom channels using a peak detector. The results are shown in the following table.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT. The list of emissions was then confirmed or updated under Alternative Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

Emissions identified within the range 30MHz – 1GHz were then formally measured using a CISPR Quasi-Peak detector.

Emissions identified within the range 1GHz – 20GHz were then formally measured using Peak and Average Detectors, as appropriate.

The measurements were performed at a 3m distance unless otherwise stated.



#### 4.1.6 Test Results

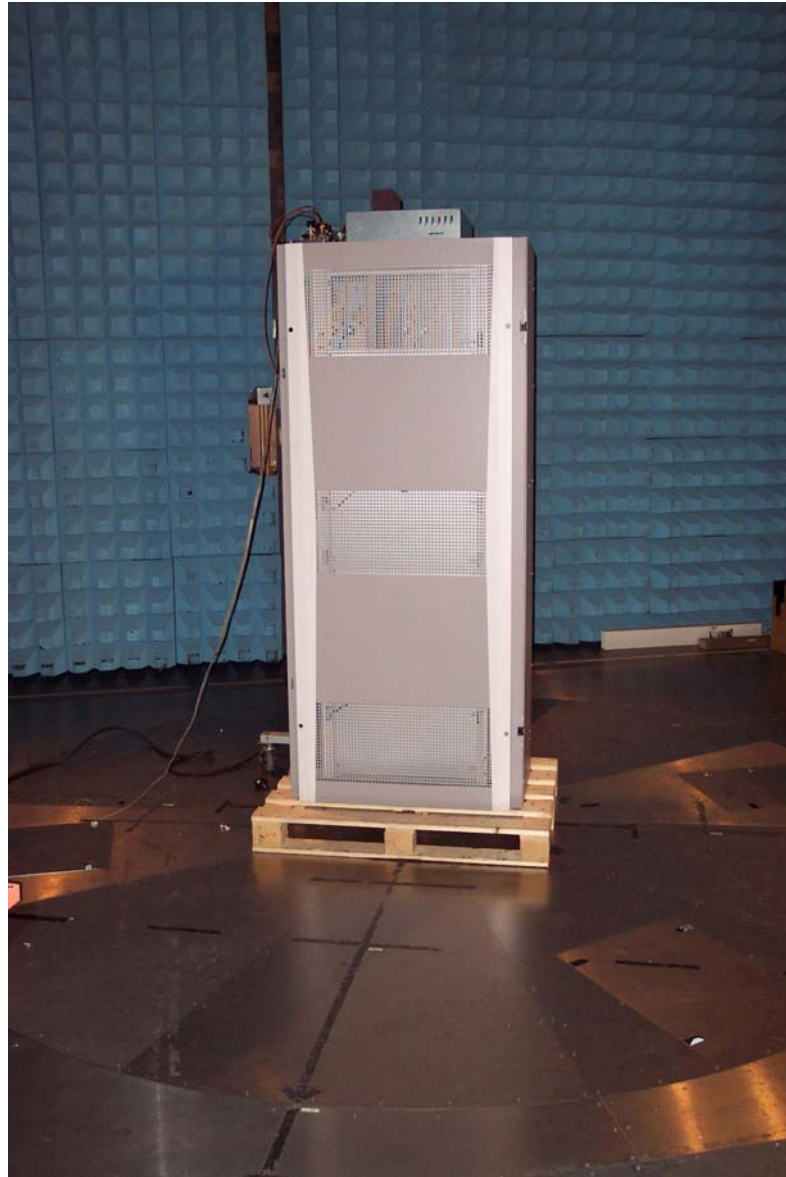
Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part 24.238 for Radiated Emissions (30MHz – 20GHz).

No EUT emissions were detected greater than the measurement system sensitivity which was at least 28dB below the limit.



4.1.7 Setup Photograph



Radiated Emissions Setup Photograph



## **SECTION 5**

### **TEST EQUIPMENT USED**



## 5.1 TEST EQUIPMENT USED

Instrument	Manufacturer	Type No	EMC / INV No	Cal. Due Date
Section 2.1				
EMI Receiver	Hewlett Packard	8542E	2286	09 Jan 2005
Bilog Antenna	Schaffner	CBL 6143	2965	12 Sept 2005
Antenna Mast	EMCO	1051	2182	—
Antenna Mast Controller	EMCO	2090	—	—
Screened Room	Siemens	EAC54300	2533	—
Sections 3.1 and 4.1				
Test Receiver	Rohde & Schwarz	ESIB 26	2958	14 Sept 2005
DRG Antenna	EMCO	3115	2397	7 July 2005
DRG Antenna	EMCO	3115	2297	7 July 2005
Horn	Microtek	AM180HATU2	2945	24 June 2005
Horn	Flann	2024-20	1396	—
Low Noise Amplifier	Miteq	AMF-3D-001080-18-13P	2457	—
Low Noise Amplifier	Avantek	AWT-18036	1080	26 June 2005
Low Noise Amplifier	Avantek	AMT-26177-33	2072	25 June 2005
10dB Attenuator	Marconi	6534/3	1494	—
3dB Attenuator	Narda	4768-3	2962	—
Signal Generator	Hewlett Packard	8672A	411	2 Mar 2005
Signal Generator	Hewlett Packard	8673B	953	10 June 2005
Signal Generator	Marconi	2031	2199	6 Oct 2005
High Pass Filter	RLC Electronics	F-100-3000-5-R	INV 4969	10 Mar 2005
High Pass Filter	Lorch Microwave	9HP7-7000-SR	INV 4093	27 Sept 2005





## 5.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are: -

Test Discipline	Frequency / Parameter	MU
Radiated Emissions, Bilog Antenna, AOATS	30MHz to 1GHz Amplitude	5.1dB*
Radiated Emissions, Horn Antenna, AOATS	1GHz to 40GHz Amplitude	6.3dB*

Worst case error for both Time and Frequency measurement 12 parts in  $10^6$ .

\* In accordance with CISPR 16-4



**SECTION 6**

**EUT PHOTOGRAPHS**



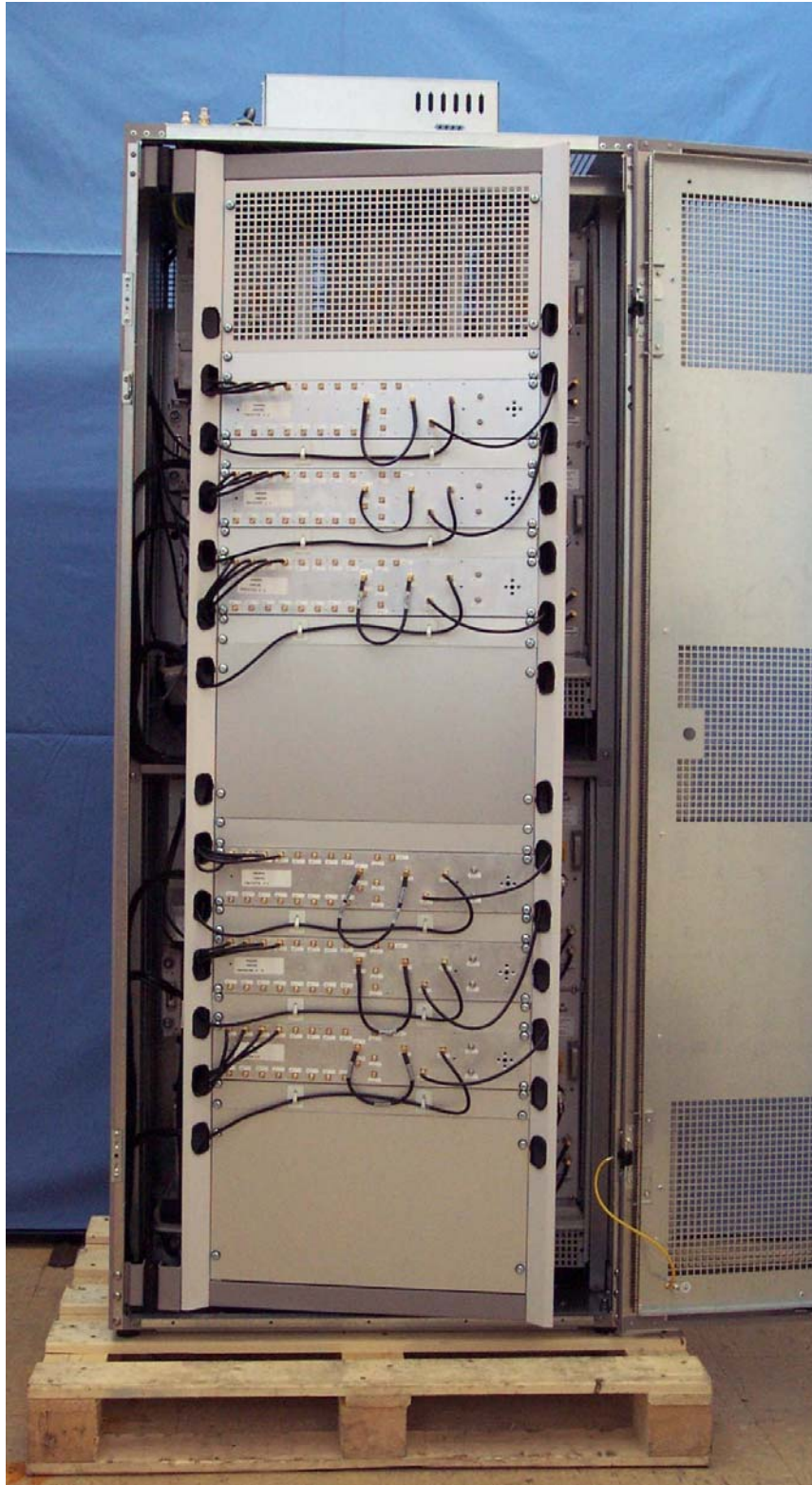
6.1.1 EUT PHOTOGRAPHS



Front View Door Closed



6.1.2 EUT PHOTOGRAPHS

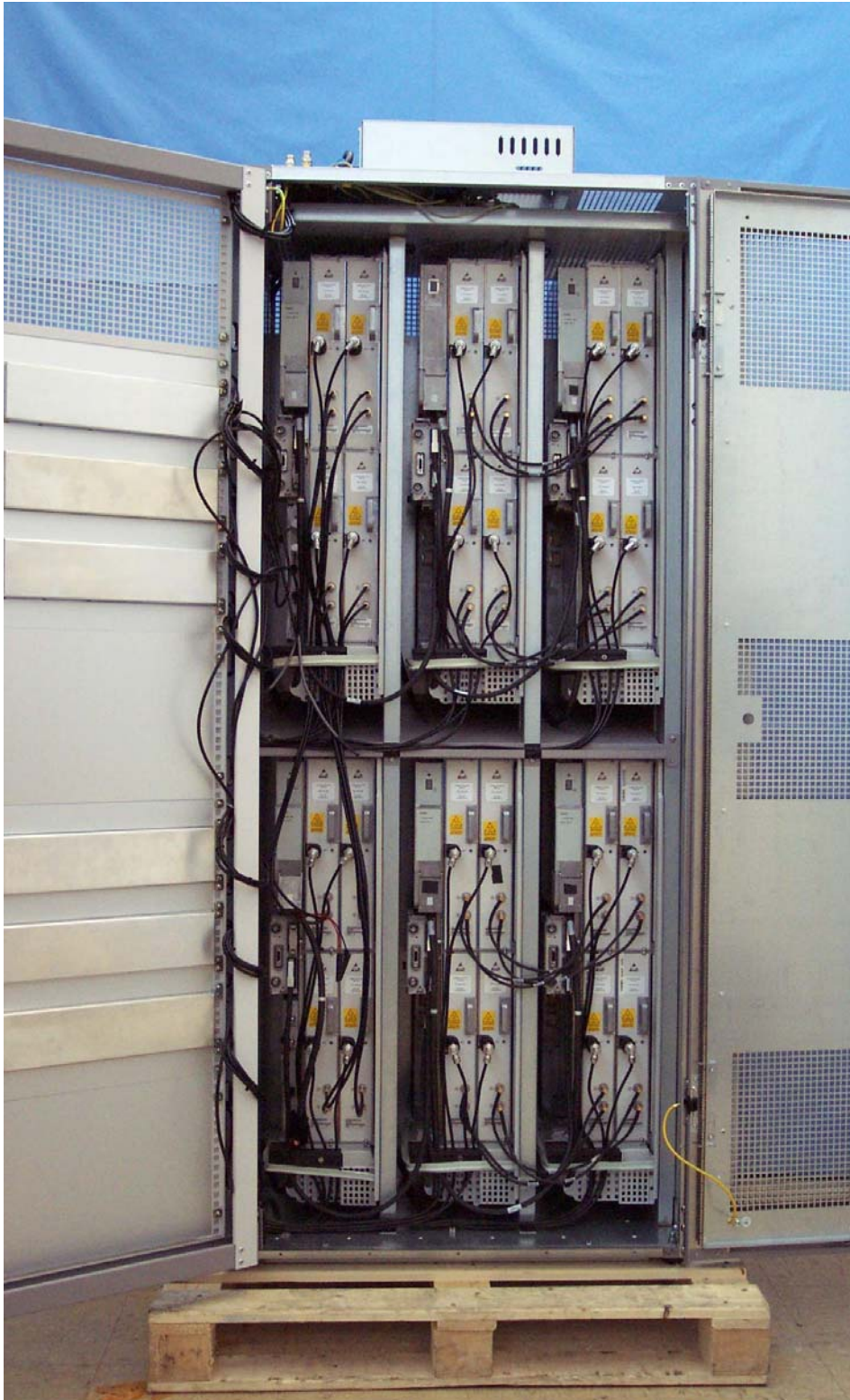


Front View Outer Door Open





6.1.3 EUT PHOTOGRAPHS



Front View Inner Door Open



## SECTION 7

### ACCREDITATION, DISCLAIMERS AND COPYRIGHT



## 7.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).

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**APPENDIX A**

**TITCHFIELD FCC SITE COMPLIANCE LETTER**





**FEDERAL COMMUNICATIONS COMMISSION**

**Laboratory Division  
7435 Oakland Mills Road  
Columbia, MD 21046**

October 18, 2002

Registration Number: 90987

TUV Product Service Ltd  
Segensworth Road  
Titchfield  
Fareham, Hampshire, PO15 5RH  
United Kingdom  
Attention: Kevan Adsetts

Re: Measurement facility located at Titchfield  
Anechoic chamber (3 meters) and 3 & 10 meter OATS  
Date of Listing: October 18, 2002

Gentlemen:

Your request for registration of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC rules. The information has, therefore, been placed on file and the name of your organization added to the list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that the file must be updated for any changes made to the facility and the registration must be renewed at least every three years.

Measurement facilities that have indicated that they are available to the public to perform measurement services on a fee basis may be found on the FCC website [www.fcc.gov](http://www.fcc.gov) under E-Filing, OET Equipment Authorization Electronic Filing, Test Firms.

Sincerely,

Thomas W Phillips  
Electronics Engineer