REPORT ON

Limited FCC Part 15 E Testing in Support of a Class 2 Permissive Change
Application for a Symbol WSAP-5030 Access Port and WSM-5030 RF Module
using a SKYNET SNP-PA5T Power Supply with Patch, Omni Directional and Integral Antennas
FCC ID: H9PWSAP5030

Report Number: OR610776/16 Issue1 January 2004

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REPORT ON Limited FCC Part 15 E Testing in support of a Class 2 Permissive Change Application for a Symbol WSAP-5030 Access Port and WSM-5030 RF Module using a Skynet SNP-PA5T Power Supply with Patch, Omni Directional and Integral Antennas

Report No OR610776/16 Issue1

January 2004

EQUIPMENT: WSAP-5030 Access Port Host Unit

FCC ID: H9PWSAP5030

SPECIFICATION: 47 CFR 15 Subpart E

PREPARED FOR: Symbol Technologies Inc
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New York
United States of America

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DATED: 13-01-04

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(Including Annex A)

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STATUS

OBJECTIVE	To undertake measurements to determine the Equipment Under Test's (EUT's) compliance with the specification.
MANUFACTURING DESCRIPTION	Access Port and RLAN Radio Module
APPLICANT	Symbol Technologies Symbol Place Winnersh Triangle Berkshire RG41 5TP
MANUFACTURERS TYPE NUMBER	WSAP-5030
MANUFACTURERS PART NUMBER	WSAP-5030
SERIAL NUMBER	No 5
HARDWARE REVISION	DVT3.1
TEST SPECIFICATION NUMBER	FCC Part 15 Subpart E, 2002-08
REGISTRATION NUMBER	OR610776
QUANTITY OF ITEMS TESTED	One
SECURITY CLASSIFICATION OF EUT	Unclassified
INCOMING RELEASE SERIAL NUMBER DATE	Declaration of Build Status 610776 29th June 2003
DISPOSAL REFERENCE NUMBER DATE	Held pending disposal N/A N/A
START OF TEST FINISH OF TEST	26th August 2003 16th December 2003
TEST ENGINEERS	S Hartley A Guy P Harrison A Rushworth
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.

TEST RATIONALE

The information contained within this report is intended to show verification of limited compliance of the Symbol Technologies Inc WSAP-5030 Access Port Host Unit and WSM-5030 RLAN Radio Module for 5.25GHz-5.35GHz and 5.725GHz-5.85GHz using Patch, High Gain Omni Directional and Integral Antennas to the requirements of FCC Specification Part 15 E for a Class 2 Permissive Change Application.

FCC ID H9PWSAP5030 & H9PWSM5030

The unit supplied for testing was a WSAP-5030 Access Port, which offers 5GHz 802.11a Wireless LAN connectivity fitted with a WSM-5030 RLAN Radio Module, which offers 2.4GHz 802.11b Wireless LAN connectivity.

Undesirable Emissions were carried out using the WSAP-5030 Access Port and WSM-5030 RLAN Radio Module fitted with Patch, Omni Directional or Integral Antennas on the WSAP-5030 and Dipole (Rubber Duck) Antennas on the WSM-5030 (except for the Integral Antenna testing where an Integral Antenna was also fitted to the WSM-5030) and a 120V, 60Hz Power Supply Unit Symbol Part No SNP-PA5T. This Power Supply Unit was selected because it was found to produce the worst-case emissions during previous testing.
Testing was performed on the Centre Channels only, for each applicable band, as full testing with alternative antennas has already been performed on these units and submitted under another application.

This report details testing carried out in accordance with:

- FCC: Part 15.407(b)(5)(6), Undesirable Emission Limits

Location Of Testing

BABT Engineers, Phil Harrison, Anthony Guy and Steve Hartley, conducted all testing (except Undesirable Emissions from 30MHz to 1GHz, which were performed at our Bearley Site) at the premises BABT, Segensworth Road, Fareham, Hampshire, PO15 5RH. Undesirable Emissions measurements were performed in a 3 metre Anechoic Chamber. A complete site description is on file with the FCC Laboratory Division, Registration Number: 90987. See Annex A.
BABT Engineer Arthur Rushworth conducted all Undesirable Emissions (from 30MHz to 1GHz) testing at the premises BABT, Snitterfield Road, Bearley, Stratford upon Avon, Warwickshire, CV37 0EX. A complete site description is on file with the FCC Laboratory Division, Registration Number: 90986. See Annex A.

SYSTEM CONFIGURATION DURING EMC TESTING

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

The test software in the EUT enabled the Test Engineer to select full power on the following channels;

5GHz functionality for Patch Antenna

TX on 5280MHz

The Output Power level (controlled by application software) was set to 1 (max power).

5GHz functionality for Omni Antenna

TX on 5280MHz
TX on 5805MHz

The Output Power level (controlled by application software) was set to 1 (max power).

5GHz functionality for Integral Antenna

TX on 5280MHz
TX on 5805MHz

The Output Power level (controlled by application software) was set to 1 (max power).

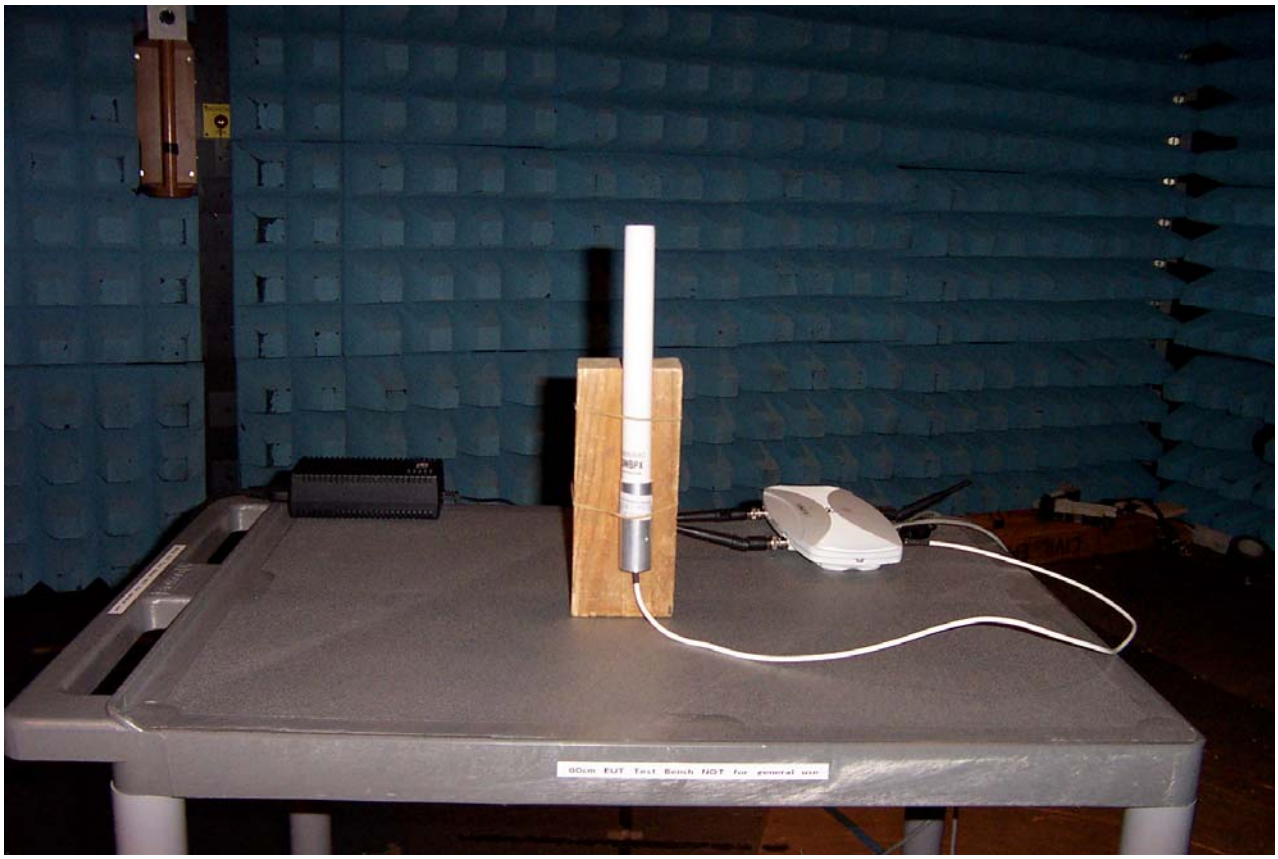
TEST SET UP PHOTOGRAPH

The photograph below shows the EUT configuration during Undesirable Emissions testing for Patch Antennas

Photograph 1

TEST SET UP PHOTOGRAPH

The photograph below shows the EUT configuration during Undesirable Emissions testing for Omni Directional Antenna



Photograph 2

TEST SET UP PHOTOGRAPH

The photograph below shows the EUT configuration during Undesirable Emissions testing for Integral Antennas

Photograph 3

EQUIPMENT INFORMATION

Equipment under Test (EUT):

Equipment	**Access Port Host Unit**	**RLAN Module for use with host unit WSAP-5030**	**100-250V AC Power Supply Unit**
Manufacturer	Symbol Technologies Inc	Symbol Technologies Inc	Skynet
Type No	WSAP-5030	WSM-5030	SNP-PA5T
Part No	WSAP-5030	WSM-5030	Not Applicable
Serial No	No 5	Not Applicable	1119327
Build Status	DVT3.1	DVT3.1	Not Applicable
Software Issue	Not Applicable	Not Applicable	Not Applicable

Equipment	**Dipole Rubber Duck Antenna 2.4GHz**	**Patch Antenna 5GHz**	**Omni Directional Antenna 5GHz**
Manufacturer	Cushcraft	Cushcraft	Cushcraft
Type No	ML 2499-APA	ML 5499-SD3	S5153WBPX
Part No	Not Applicable	Not Applicable	Not Applicable
Serial No	Not Applicable	Not Applicable	Not Applicable
Build Status	Not Applicable	Not Applicable	Not Applicable
Software Issue	Not Applicable	Not Applicable	Not Applicable

Equipment	**Integral Antenna 2.4GHz**	**Integral Antenna 5GHz**
Manufacturer	Cushcraft	Tecom
Type No	WSM-5030-210-WW	WSM-5040-110-WW
Part No	Not Applicable	Not Applicable
Serial No	Not Applicable	Not Applicable
Build Status	Not Applicable	Not Applicable
Software Issue	Not Applicable	Not Applicable

EQUIPMENT INFORMATION - continued

Test Equipment and Ancillaries Used For Test

Instrument	Manufacturer	Type No	EMC	Cal. Due
Esvp Test Receiver	ROH	ESVP	1807	24 July 04
Bilog Antenna	YRK	CBL6111B	2451	07 Oct 04
Turntable Controller	VAR	RH253	1858	TU
Mast Controller	EMC	1050	1844	TU
Antenna Mast	EMC	1050	1845	TU
Open Area Site 2	ASS	OATS2	2280	28 Nov 05
Aneroid Barometer	VAR	750-1210-02	1932	TU
High Pass Filter	LOR	9HP7-7000-SR	INV4903	TU
Signal Generator	HEW	8673B	953	05 June 04
Emi Test Receiver	ROH	ESIB40	2917	04 Feb 04
Turntable Controller	H-D	HD 050	2528	TU
DRG Ant	EMC	3115	2397	04 July 04
Horn Ant	EMC	3115	2297	04 July 04
Bilog Antenna	CHA	CBL 6143	2860	11Apr 04
Turntable & Controller	HD	HD 050	2528	TU
Antenna Mast	EMC	2070	-	TU
Antenna Mast Controller	EMC	2090	-	TU
Screened Room 5	SIE	EAC 54300	2533	TU
Low Noise Amplifier (1-8GHz)	MIT	AMF-3D-001080-18-13P	2457	TU
Signal Generator	HEW	8672A	411	26 Feb 04
Amplifier (8-18GHz)	AVA	AWT-18036	1081	26 June 04
Horn (18-40GHz)	ADV	AM180HA-K-TU2	2945	15 May 05
Amplifier (18-40GHz)	NAR	DB02-0447	2936	23 Apr 04
Test Receiver	ROH	ESVP	1807	24 July 04
Spectrum Monitor	ROH	EZM	1811	TU
Bilog Antenna	CHA	CBL6111B	2451	7 Oct 04
Turntable & Controller	BRI	RH253	1858	TU
Mast Controller	EMC	1050	1844/5	TU
Printer	EPS	Colour 660	7023	TU
Open Area Test Site	ASS	OATS 2	2280	28 Nov 05
Barometer	DIP	-	1938	TU
Hygrometer	RTC	A1	INV4066	10 Sept 04
Thermohydrograph	RTC	A1 Hygromer	INV3162	28 Nov 04
HPA Monitor	DIP	-	1932	TU

Note(s)

All items are calibrated annually, except where labelled TU (Traceability Unscheduled). These items are calibrated within the test configurations using the calibrated equipment listed above.

Instrumentation Used For Exercising The EUT

Instrument	Manufacturer	Type No	INV No
Laptop Computer	Dell	Latitude CPI	N/A
Laptop Computer	Dell	Latitude C400	N/A

EQUIPMENT INFORMATION - continued

Key To Manufacturers

ADV	Advanced Microtek
ASS	Assessment Services
AVA	Avantek
BRI	British Turntables
CHA	Chase
DIP	Diplex
EMC	Emco
EPS	Epson
HEW	Hewlett Packard
LOR	Lorch
H-D	No Data
MIT	Miteq
NAR	Narda
SIE	Siemens
ROH	Rohde & Schwarz
RTC	Rotronic
VAR	Various
YRK	York Electronics

TEST RESULTS FOR PATCH ANTENNA

Test Case	:	Undesirable Emissions
Test Date	:	3rd September 2003
Rule Parts	:	15.407(b)(5) (6)

Measurement Method

Testing to the requirements of FCC CFR 47: Part 15 Subpart E, Section15.407 (b)(5) (6) for Undesirable Emissions was carried out on the Measurement Test Facility detailed in Annex A. Section 15.407(b)(5) (6) also requires Rule parts 15.205 and 15.209 to be applied.

A preliminary profile of the Undesirable Emissions was obtained by operating the Equipment Under Test (EUT) on a remotely controlled turntable within a semi-anechoic chamber; measurements were taken at a 3m distance unless otherwise stated. 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, a search was made in the frequency range 30MHz to 40GHz. The list of worst-case emissions was then confirmed or updated under Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

30MHz – 1GHz emissions levels were then formally measured using a CISPR Quasi-Peak detector.
1GHz – 40GHz emissions levels were then formally measured using Peak and Average detectors.

(Note: Peak measurements performed using a Resolution and Video Bandwidth of 1MHz, Average measurements performed using a Resolution Bandwidth of 1MHz and a Video Bandwidth of 10Hz)

The EUT was connected to a 120V 60Hz supply.

Measurements were made with the EUT transmitting at the following frequency.

5280MHz

Undesirable Emissions from 30MHz to 1GHz were made using a Rohde and Schwarz ESVP Test Receiver.

Undesirable Emissions from 1GHz to 40GHz were made using a Rohde and Schwarz ESIB 40 Test Receiver.

The test was performed in accordance with ANSI C63.4.

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

Test Case : Undesirable Emissions - continued

Test Date : 2nd September 2003

Rule Parts : 15.407(b)(5) (6)

30MHz - 1GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: The EUT met the requirements of FCC Part 15.407(b)(5) (6), 15.205 and 15.209 for Undesirable Emissions (30MHz – 1GHz).

EUT Tx on 5.280GHz

30MHz – 1GHz Alternative Open Area Test Site Results: The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
MHz	H/V	cm	deg	dBµV/m	µV/m	dBµV/m	µV/m
36.0289	V	100	89	34.5	53.1	40.0	100.0
37.5379	V	100	213	36.5	66.8	40.0	100.0
56.7811	V	100	352	34.4	52.5	40.0	100.0
60.1985	V	100	289	36.0	63.1	40.0	100.0
400.0000	V	112	182	33.7	48.4	46.0	200.0
872.9757	V	100	346	25.2	18.2	46.0	200.0

ABBREVIATIONS FOR ABOVE TABLES

H	Horizontal Polarisation	V	Vertical Polarisation
Pol	Polarisation	Hgt	Height
deg	degree	Azm	Azimuth

Procedure: Test Performed in accordance with ANSI C63.4.

Performed by: A Rushworth, EMC Engineer.

Test Case : Undesirable Emissions - continued

Test Date : 29th August 2003

Rule Parts : 15.407(b)(5) (6)

1GHz - 40GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part and 15.407(b)(5) (6), 15.205 and 15.209 for Undesirable Emissions (1GHz – 40GHz).

EUT Tx on 5.280GHz

1GHz – 40GHz Alternative Open Area Test Site Results: The levels of the six highest emissions measured in accordance with the specification are presented below: -

Frequency	Antenna		Turntable	Peak Field Strength	Peak Limit	EIRP Result	Average Field Strength	Average Limit	EIRP Limit
	Pol	Height	Azimuth						
GHz	H/V	cm	deg	dBµV/m	dBµV/m	dBm	dBµV/m	dBµV/m	dBm
5.0561*	V	100	9	67.1	84.0	N/A	58.9	64.0	N/A
5.2161*	V	100	3	70.6	N/A	-34.2	N/A	N/A	-27.0
5.3513*	V	100	3	68.6	84.0	N/A	57.7	64.0	N/A
5.3761*	V	100	3	67.8	84.0	N/A	58.4	64.0	N/A
5.4081*	V	100	4	69.3	84.0	N/A	57.1	64.0	N/A
5.4401*	V	100	4	66.7	84.0	N/A	56.0	64.0	N/A

* Measurement made at 1m, limit increased by 10dB.

EIRP Results are only taken for frequencies that fall Outside the Restricted Band in accordance 15.407(b)(5)(6)

Note: The Measurements in the above tables marked N/A are Not Applicable because the frequency does not fall within the Restricted Band (15.205) and hence Average Measurements are not required.

ABBREVIATIONS FOR ABOVE TABLES

H	Horizontal Polarisation	V	Vertical Polarisation
Pol	Polarisation	deg	degree

Procedure: Test Performed in accordance with ANSI C63.4.

Performed by: P J Harrison, EMC Engineer.

PHOTOGRAPHS OF EQUIPMENT

Photograph 4
Front View Symbol WSAP 5030 Access Port with WSM 5030 RF Module and Dipole (Rubber Duck) Antennas (2.4GHz), Patch Antennas (5GHz) Power Supply Unit SNP-PA5T

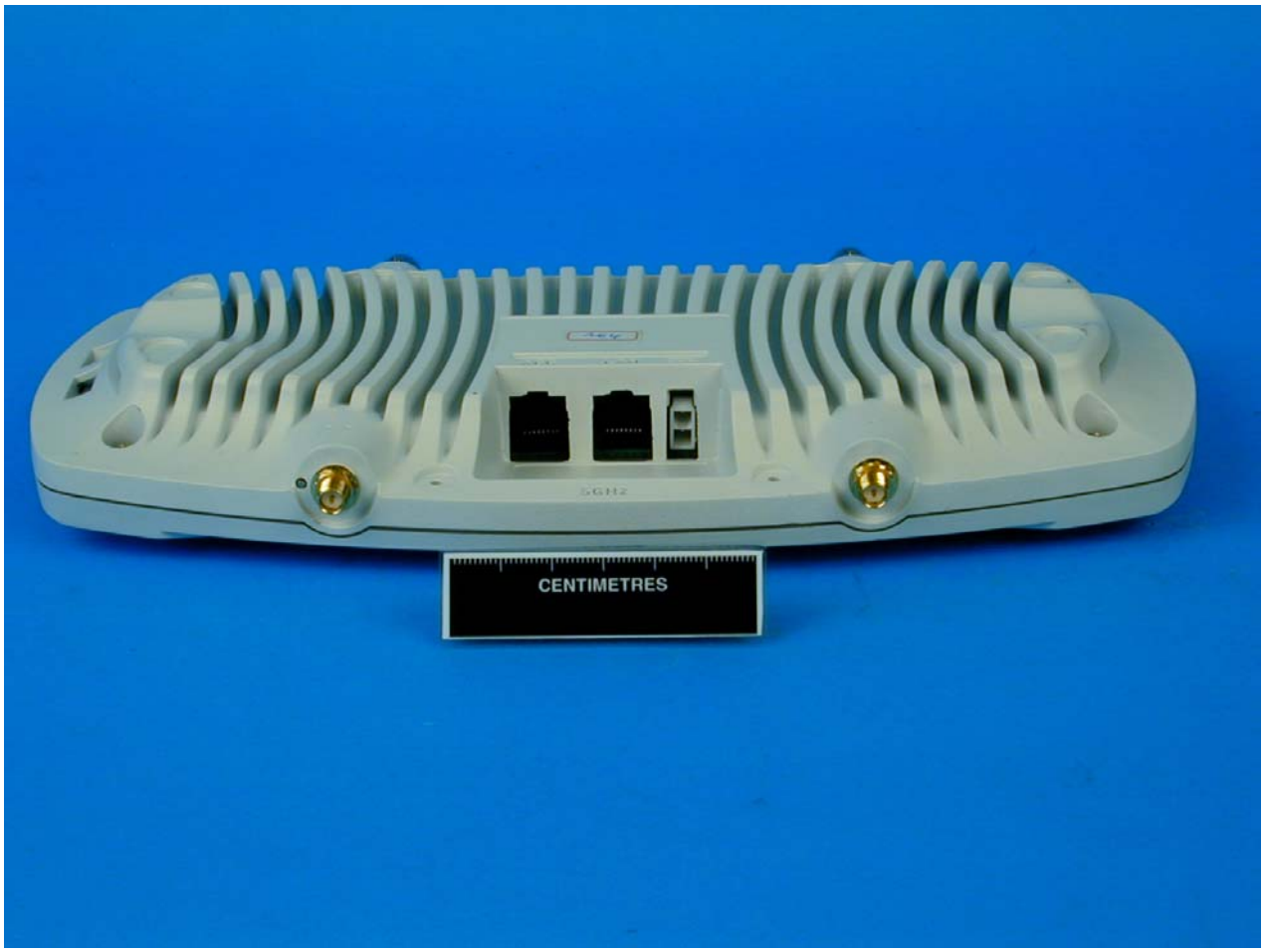
PHOTOGRAPHS OF EQUIPMENT

Photograph 5
Front View of 5GHz Patch Antennas

PHOTOGRAPHS OF EQUIPMENT

Photograph 6
Rear View of 5GHz Patch Antennas

PHOTOGRAPHS OF EQUIPMENT



Photograph 7
Rear View Symbol WSAP 5030 Access Port showing
Antenna connectors (5GHz)

PHOTOGRAPHS OF EQUIPMENT

Photograph 8
View of 2.4GHz Dipole (Rubber Duck) Antennas

PHOTOGRAPHS OF EQUIPMENT

Photograph 9
Label View of SNP-PA5T Power Supply Unit

TEST RESULTS FOR OMNI DIRECTIONAL ANTENNA

Test Case	:	Undesirable Emissions
Test Date	:	7th December 2003
Rule Parts	:	15.407(b)(5) (6)

Measurement Method

Testing to the requirements of FCC CFR 47: Part 15 Subpart E, Section 15.247 (b)(5) (6) for Undesirable Emissions was carried out on the Measurement Test Facility detailed in Annex A. Section 15.407(b)(5) (6) also requires Rule parts 15.205 and 15.209 to be applied.

A preliminary profile of the Undesirable Emissions was obtained by operating the Equipment Under Test (EUT) on a remotely controlled turntable within a semi-anechoic chamber; measurements were taken at a 3m distance unless otherwise stated. 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, a search was made in the frequency range 30MHz to 40GHz. The list of worst-case emissions was then confirmed or updated under Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

30MHz – 1GHz emissions levels were then formally measured using a CISPR Quasi-Peak detector.
1GHz – 40GHz emissions levels were then formally measured using Peak and Average detectors.

(Note: Peak measurements performed using a Resolution and Video Bandwidth of 1MHz, Average measurements performed using a Resolution Bandwidth of 1MHz and a Video Bandwidth of 10Hz)

The EUT was connected to a 120V 60Hz supply.

Measurements were made with the EUT transmitting at the following frequencies in turn.

5280MHz
5805MHz

Undesirable Emissions from 30MHz to 1GHz were made using a Rohde and Schwarz ESVP Test Receiver.

Undesirable Emissions from 1GHz to 40GHz were made using a Rohde and Schwarz ESIB 40 Test Receiver.

The test was performed in accordance with ANSI C63.4.

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

Test Case : Undesirable Emissions - continued

Test Date : 16th December 2003

Rule Parts : 15.407(b)(5) (6)

30MHz - 1GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: The EUT met the requirements of FCC Part 15.407(b)(5) (6), 15.205 and 15.209 for Undesirable Emissions (30MHz – 1GHz).

EUT Tx on 5.280GHz

30MHz – 1GHz Alternative Open Area Test Site Results: The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
MHz	H/V	cm	deg	dBµV/m	µV/m	dBµV/m	µV/m
37.5190	V	101	100	37.2	72.4	40.0	100.0
51.3771	V	100	110	30.3	32.7	40.0	100.0
86.0418	V	100	297	20.2	10.2	40.0	100.0
101.8601	V	100	144	31.0	35.5	43.5	150.0
467.7882	V	100	72	32.1	40.3	46.0	200.0
483.9860	V	100	69	29.4	29.5	46.0	200.0

ABBREVIATIONS FOR ABOVE TABLES

H	Horizontal Polarisation	V	Vertical Polarisation
Pol	Polarisation	Hgt	Height
deg	degree	Azm	Azimuth

Procedure: Test Performed in accordance with ANSI C63.4.

Performed by: A Rushworth, EMC Engineer.

Test Case : Undesirable Emissions - continued

Test Date : 16th December 2003

Rule Parts : 15.407(b)(5) (6)

30MHz - 1GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: The EUT met the requirements of FCC Part 15.407(b)(5) (6), 15.205 and 15.209 for Undesirable Emissions (30MHz – 1GHz).

EUT Tx on 5.805GHz

30MHz – 1GHz Alternative Open Area Test Site Results: The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
MHz	H/V	cm	deg	dBµV/m	µV/m	dBµV/m	µV/m
37.5190	V	100	118	37.1	71.6	40.0	100.0
51.7719	V	100	120	30.0	31.6	40.0	100.0
86.0494	V	100	178	19.7	9.7	40.0	100.0
101.8601	V	100	145	30.8	34.7	43.5	150.0
467.7837	V	100	68	30.7	34.3	46.0	200.0
483.9862	V	100	68	29.4	29.5	46.0	200.0

ABBREVIATIONS FOR ABOVE TABLES

H	Horizontal Polarisation	V	Vertical Polarisation
Pol	Polarisation	Hgt	Height
deg	degree	Azm	Azimuth

Procedure: Test Performed in accordance with ANSI C63.4.

Performed by: A Rushworth, EMC Engineer.

Test Case : Undesirable Emissions - continued

Test Date : 7th December 2003

Rule Parts : 15.407(b)(5) (6)

1GHz - 40GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part and 15.407(b)(5) (6), 15.205 and 15.209 for Undesirable Emissions (1GHz – 40GHz).

EUT Tx on 5.280GHz

1GHz – 40GHz Alternative Open Area Test Site Results: The levels of the highest emissions measured in accordance with the specification are presented below: -

Frequency	Antenna		Turntable	Peak Field Strength	Peak Limit	EIRP Result	Average Field Strength	Average Limit	EIRP Limit
	Pol	Height	Azimuth						
GHz	H/V	cm	deg	dBµV/m	dBµV/m	dBm	dBµV/m	dBµV/m	dBm
2.174	H	102	0	50.7	68.2	-44.5	N/A	N/A	-27.0
5.214	V	125	24	61.0	68.2	-34.2	N/A	N/A	-27.0
5.341	V	113	27	62.6	68.2	-32.6	N/A	N/A	-27.0
5.535	V	128	19	60.3	68.2	-34.9	N/A	N/A	-27.0
8.300*	H	100	0	41.4	84.0	N/A	N/A	N/A	N/A
11.000*	H	100	0	44.2	84.0	N/A	N/A	N/A	N/A
14.500*	H	100	0	55.0	84.0	N/A	N/A	N/A	N/A

* System Noise Measurement made at 1m, limit increased by 10dB.

EIRP Results are only taken for frequencies that fall Outside the Restricted Band in accordance 15.407(b)(5)(6)

Note: The Measurements in the above tables marked N/A are Not Applicable because the frequency does not fall within the Restricted Band (15.205) and hence Average Measurements are not required.

ABBREVIATIONS FOR ABOVE TABLES

H	Horizontal Polarisation	V	Vertical Polarisation
Pol	Polarisation	deg	degree

Procedure: Test Performed in accordance with ANSI C63.4.

Performed by: S C Hartley and A Guy, EMC Engineers.

Test Case : Undesirable Emissions - continued

Test Date : 7th December 2003

Rule Parts : 15.407(b)(5) (6)

1GHz - 40GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part and 15.407(b)(5) (6), 15.205 and 15.209 for Undesirable Emissions (1GHz – 40GHz).

EUT Tx on 5.805GHz

1GHz – 40GHz Alternative Open Area Test Site Results: The levels of the six highest emissions measured in accordance with the specification are presented below: -

Frequency	Antenna		Turntable	Peak Field Strength	Peak Limit	EIRP Result	Average Field Strength	Average Limit	EIRP Limit
	Pol	Height	Azimuth						
GHz	H/V	cm	deg	dBµV/m	dBµV/m	dBm	dBµV/m	dBµV/m	dBm
2.174	H	100	0	50.6	68.2	-44.6	N/A	N/A	-27.0
5.088	V	120	50	60.4	74.0	N/A	50.2	54.0	N/A
5.471	V	121	10	61.2	68.2	-34.0	N/A	N/A	-27.0
8.300*	H	100	0	41.4	84.0	N/A	N/A	N/A	N/A
11.000*	H	100	0	44.2	84.0	N/A	N/A	N/A	N/A
14.500*	H	100	0	55.0	84.0	N/A	N/A	N/A	N/A

* System Noise Measurement made at 1m, limit increased by 10dB.

EIRP Results are only taken for frequencies that fall Outside the Restricted Band in accordance 15.407(b)(5)(6)

Note: The Measurements in the above tables marked N/A are Not Applicable because the frequency does not fall within the Restricted Band (15.205) and hence Average Measurements are not required.

ABBREVIATIONS FOR ABOVE TABLES

H	Horizontal Polarisation	V	Vertical Polarisation
Pol	Polarisation	deg	degree

Procedure: Test Performed in accordance with ANSI C63.4.

Performed by: S C Hartley and A Guy, EMC Engineer.

PHOTOGRAPHS OF EQUIPMENT

Photograph 10
Front View Symbol WSAP 5030 Access Port with WSM 5030 RF Module and Dipole (Rubber Duck) Antennas (2.4GHz), Omni Directional Antenna (5GHz) Power Supply Unit SNP-PA5T

PHOTOGRAPHS OF EQUIPMENT

Photograph 11
View of 5GHz Omni Directional Antenna

TEST RESULTS FOR INTEGRAL ANTENNA

Test Case	:	Undesirable Emissions
Test Date	:	6th September 2003
Rule Parts	:	15.407(b)(5) (6)

Measurement Method

Testing to the requirements of FCC CFR 47: Part 15 Subpart E, Section 15.407 (b)(5) (6) for Undesirable Emissions was carried out on the Measurement Test Facility detailed in Annex A. Section 15.407(b)(5) (6) also requires Rule parts 15.205 and 15.209 to be applied.

A preliminary profile of the Undesirable Emissions was obtained by operating the Equipment Under Test (EUT) on a remotely controlled turntable within a semi-anechoic chamber; measurements were taken at a 3m distance unless otherwise stated. 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, a search was made in the frequency range 30MHz to 40GHz. The list of worst-case emissions was then confirmed or updated under Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

30MHz – 1GHz emissions levels were then formally measured using a CISPR Quasi-Peak detector.
1GHz – 40GHz emissions levels were then formally measured using Peak and Average detectors.

(Note: Peak measurements performed using a Resolution and Video Bandwidth of 1MHz, Average measurements performed using a Resolution Bandwidth of 1MHz and a Video Bandwidth of 10Hz)

The EUT was connected to a 120V 60Hz supply.

Measurements were made with the EUT transmitting at the following frequencies in turn.

5280MHz
5805MHz

Undesirable Emissions from 30MHz to 1GHz were made using a Rohde and Schwarz ESVP Test Receiver.

Undesirable Emissions from 1GHz to 40GHz were made using a Rohde and Schwarz ESIB 40 Test Receiver.

The test was performed in accordance with ANSI C63.4.

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

Test Case : Undesirable Emissions - continued

Test Date : 6th September 2003

Rule Parts : 15.407(b)(5) (6)

30MHz - 1GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: The EUT met the requirements of FCC Part 15.407(b)(5) (6), 15.205 and 15.209 for Undesirable Emissions (30MHz – 1GHz).

EUT Tx on 5.280GHz

30MHz – 1GHz Alternative Open Area Test Site Results: The levels of the highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
MHz	H/V	cm	deg	dBµV/m	µV/m	dBµV/m	µV/m
36.1289	V	100	210	31.3	36.7	40.0	100.0
39.5494	V	100	233	32.1	40.3	40.0	100.0
56.7732	V	100	169	38.3	82.2	40.0	100.0
60.2235	V	100	284	37.3	73.3	40.0	100.0
79.7431	V	100	59	31.9	39.4	40.0	100.0
81.2193	V	100	30	32.3	41.2	40.0	100.0

ABBREVIATIONS FOR ABOVE TABLES

H	Horizontal Polarisation	V	Vertical Polarisation
Pol	Polarisation	Hgt	Height
deg	degree	Azm	Azimuth

Procedure: Test Performed in accordance with ANSI C63.4.

Performed by: A Rushworth, EMC Engineer.

Test Case : Undesirable Emissions - continued

Test Date : 6th September 2003

Rule Parts : 15.407(b)(5) (6)

30MHz - 1GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: The EUT met the requirements of FCC Part 15.407(b)(5) (6), 15.205 and 15.209 for Undesirable Emissions (30MHz – 1GHz).

EUT Tx on 5.805GHz

30MHz – 1GHz Alternative Open Area Test Site Results: The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
MHz	H/V	cm	deg	dBµV/m	µV/m	dBµV/m	µV/m
36.1289	V	100	230	31.5	37.6	40.0	100.0
39.5494	V	100	241	32.1	40.3	40.0	100.0
56.7732	V	100	152	38.9	88.1	40.0	100.0
60.2235	V	100	310	38.4	83.2	40.0	100.0
79.7431	V	100	59	31.1	35.9	40.0	100.0
81.2193	V	100	58	32.5	42.2	40.0	100.0

ABBREVIATIONS FOR ABOVE TABLES

H	Horizontal Polarisation	V	Vertical Polarisation
Pol	Polarisation	Hgt	Height
deg	degree	Azm	Azimuth

Procedure: Test Performed in accordance with ANSI C63.4.

Performed by: A Rushworth, EMC Engineer.

Test Case : Undesirable Emissions - continued

Test Date : 27th August 2003

Rule Parts : 15.407(b)(5) (6)

1GHz - 40GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part and 15.407(b)(5) (6), 15.205 and 15.209 for Undesirable Emissions (1GHz – 40GHz).

EUT Tx on 5.280GHz

1GHz – 40GHz Alternative Open Area Test Site Results: The levels of the highest emissions measured in accordance with the specification are presented below: -

Frequency	Antenna		Turntable	Peak Field Strength	Peak Limit	EIRP Result	Average Field Strength	Average Limit	EIRP Limit
	Pol	Height	Azimuth						
GHz	H/V	cm	deg	dBµV/m	dBµV/m	dBm	dBµV/m	dBµV/m	dBm
2.0202	V	105	108	55.3	68.2	-39.9	N/A	N/A	-27.0

EIRP Results are only taken for frequencies that fall Outside the Restricted Band in accordance 15.407(b)(5)(6)

Note: The Measurements in the above tables marked N/A are Not Applicable because the frequency does not fall within the Restricted Band (15.205) and hence Average Measurements are not required.

ABBREVIATIONS FOR ABOVE TABLES

H	Horizontal Polarisation	V	Vertical Polarisation
Pol	Polarisation	deg	degree

Procedure: Test Performed in accordance with ANSI C63.4.

Performed by: P J Harrison, EMC Engineer.

Test Case : Undesirable Emissions - continued

Test Date : 27th August 2003

Rule Parts : 15.407(b)(5) (6)

1GHz - 40GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part and 15.407(b)(5) (6), 15.205 and 15.209 for Undesirable Emissions (1GHz – 40GHz).

EUT Tx on 5.805GHz

1GHz – 40GHz Alternative Open Area Test Site Results: The levels of the highest emissions measured in accordance with the specification are presented below: -

Frequency	Antenna		Turntable	Peak Field Strength	Peak Limit	EIRP Result	Average Field Strength	Average Limit	EIRP Limit
	Pol	Height	Azimuth						
GHz	H/V	cm	deg	dBµV/m	dBµV/m	dBm	dBµV/m	dBµV/m	dBm
2.0203	V	104	106	55.6	68.2	-39.6	N/A	N/A	-27.0

EIRP Results are only taken for frequencies that fall Outside the Restricted Band in accordance 15.407(b)(5)(6)

Note: The Measurements in the above tables marked N/A are Not Applicable because the frequency does not fall within the Restricted Band (15.205) and hence Average Measurements are not required.

ABBREVIATIONS FOR ABOVE TABLES

H	Horizontal Polarisation	V	Vertical Polarisation
Pol	Polarisation	deg	degree

Procedure: Test Performed in accordance with ANSI C63.4.

Performed by: P J Harrison, EMC Engineer.

PHOTOGRAPHS OF EQUIPMENT

Photograph 12
Front View Symbol WSAP 5030 Access Port with WSM 5030 RF Module and Dipole (Rubber Duck) Antennas (2.4GHz), Integral Antennas (5GHz) Power Supply Unit SNP-PA5T

PHOTOGRAPHS OF EQUIPMENT

Photograph 13
View of 5GHz Integral Antenna

MEASUREMENT UNCERTAINTY

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

In the frequency range 30MHz to 1000MHz

For Undesirable Emissions, Quasi-Peak Measurements using the ESVP Test Receiver and Bilog Antenna: - Frequency ±5ppm + 500Hz Amplitude ±4.1dB

In the frequency range 1GHz to 25GHz

For Undesirable Emissions, using the Rohde and Schwarz ESIB 40 Test Receiver: -

Frequency	$\pm 2 \times 10^{-7}$ x Centre Frequency
Amplitude	±3.4dB

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).

ANNEX A
FCC SITE COMPLIANCE LETTERS

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 under E-Filing, OET Equipment Authorization Electronic Filing, Test Firms.

Sincerely,

Thomas W. Phillips

Thomas W Phillips
Electronics Engineer

FEDERAL COMMUNICATIONS COMMISSION
Laboratory Division
7435 Oakland Mills Road
Columbia, MD. 21046

September 08, 2000

Registration Number: 90986

BABT Product Service
Snitterfield Road
Bearley, Stratford-upon-Avon
Warwickshire CV37 0EX
United Kingdom
Attention: Jensen Adams

Re: Measurement facility located at Bearley
3 & 10 meter site
Date of Listing: September 08, 2000

Gentlemen:

Your submission of the description 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 description has, therefore, been placed on file and the name of your organization added to the Commission's 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 this filing must be updated for any changes made to the facility, and at least every three years from the date of listing the data on file must be certified as current.

If requested, the above mentioned facility has been added to our list of those who perform these measurement services for the public on a fee basis. An up-to-date list of such public test facilities is available on the Internet on the FCC Website at WWW.FCC.GOV, E-Filing, OET Equipment Authorization Electronic Filing.

Sincerely,

Thomas W Phillips
Electronics Engineer