Product Service

Choose certainty.
Add value.

Report On

FCC Testing of the
Sharp CDMA SHI15 Dual Band CDMA (BC0 and BC6) and Tri Band GSM (900, 1800 and 1900 MHz) Dual Mode Cellular Phone with Bluetooth, FeliCa, WLAN and GPS
In accordance with FCC CFR 47 Part 15C

COMMERCIAL-IN-CONFIDENCE

FCC ID: APYHRO00171

Document 75917027 Report 06 Issue 1 June 2012

TÜV SÜD Product Service Ltd, Octagon House, Concorde Way, Segensworth North,
Fareham, Hampshire, United Kingdom, PO15 5RL
Tel: +44 (0) 1489 558100. Website: www.tuvps.co.uk

REPORT ON

FCC Testing of the
Sharp CDMA SHI15 Dual Band CDMA (BC0 and BC6) and Tri Band GSM (900, 1800 and 1900 MHz) Dual Mode Cellular Phone with Bluetooth, FeliCa, WLAN and GPS
In accordance with FCC CFR 47 Part 15C

Document 75917027 Report 06 Issue 1

June 2012

PREPARED FOR

Sharp Communication Compliance Ltd
Azure House
Bagshot Road
Bracknell
Berkshire
RG12 7QY

PREPARED BY

Natalie Bennett
Senior Administrator (Technical)

APPROVED BY

Mark Jenkins
Authorised Signatory

DATED 21 June 2012

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 Part 15C. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

G Lawler S Bennett

Product Service

CONTENTS

Product Service

SECTION 1

REPORT SUMMARY

FCC Testing of the
Sharp CDMA SHI15 Dual Band CDMA (BC0 and BC6) and Tri Band GSM (900, 1800 and 1900 MHz) Dual Mode Cellular Phone with Bluetooth, FeliCa, WLAN and GPS
In accordance with FCC CFR 47 Part 15C

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the FCC Testing of the Sharp CDMA SHI15 Dual Band CDMA (BC0 and BC6) and Tri Band GSM (900, 1800 and 1900 MHz) Dual Mode Cellular Phone with Bluetooth, FeliCa, WLAN and GPS to the requirements of FCC CFR 47 Part 15C.

Objective	To perform FCC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Sharp Corporation
Model Number(s)	CDMA SHI15
Serial Number(s)	IMEI 004401114000207
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 15C (2011)
Incoming Release Date	Application Form 02 May 2012
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	9100 02 April 2012
Start of Test	23 May 2012
Finish of Test	19 June 2012
Name of Engineer(s)	G Lawler S Bennett
Related Document(s)	ANSI C63.10: 2009

Product Service

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 15C is shown below.

Section	Spec Clause	Test Description	Result	Comments/Base Standard
FeliCa				
2.1	15.225 (a)(b)(c)(d)	Field Strength of any Emission	Pass	
2.2	15.225, 15.215 (c)	Occupied Bandwidth	Pass	
2.3	15.225 (e)	Frequency Stability Under Temperature Variations	Pass	

Product Service

1.3 APPLICATION FORM

APPLICANT'S DETAILS			
COMPANY NAME :	Sharp Telecommunications of Europe Ltd		
ADDRESS :	Azure House, Bagshot Road Bracknell, Berkshire RG12 7QY		
NAME FOR CONTACT PURPOSES : Ken Newman			
TELEPHONE NO: 01344 301 883	FAX NO:	01344 300 293	
		E-MAIL:	ken.newman@sharp.eu

EQUIPMENT INFORMATION

Equipment designator:
Model name/number CDMA SHI15 Identification number APYHRO00171

Supply Voltage:

[ ]	AC mains	State AC voltage ……. V	and AC frequency …… Hz
[ ]	DC (external)	State DC voltage ……. V	and DC current …… A
[X]	DC (internal)	State DC voltage …3.7 V	and Battery type…Li-Ion.

Frequency characteristics:
Frequency range 13.56MHz to 13.56MHz Channel spacing ……
(if channelized)

Designated test frequencies:
Bottom: ……. MHz Middle: …… MHz Top: ……..MHz

Power characteristics:
Maximum transmitter power ……..W Minimum transmitter power …… W
(if variable)

[X] Continuous transmission
[ ] Intermittent transmission State duty cycle ……
If intermittent, can transmitter be set to continuous transmit test mode? Y/~~N~~

Antenna characteristics:

[ ]	Antenna connector	State impedance ……ohm
[ ]	Temporary antenna connector	State impedance ……. ohm
[X]	Integral antenna	State gain 0 dBi

Modulation characteristics:

[X]	Amplitude (10%)	[ ]	Other
[ ]	Frequency	Details: ……..	
[ ]	Phase		

Can the transmitter operate un-modulated? ~~Y~~/N
ITU Class of emission: ……

Extreme conditions:

Maximum temperature	60 ºC	Minimum temperature	-20 ºC
Maximum supply voltage	4.0 V	Minimum supply voltage	3.7 V

I hereby declare that I am entitled to sign on behalf of the applicant and that the information supplied is correct and complete.

Signature : Satomi Amaki
Name : Satomi Amaki
Position held : Manager
Date : 02 May 2012

Product Service

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Sharp CDMA SHI15 Dual Band CDMA (BC0 and BC6) and Tri Band GSM (900, 1800 and 1900 MHz) Dual Mode Cellular Phone with Bluetooth, FeliCa, WLAN and GPS. A full technical description can be found in the manufacturer's documentation.

1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure.

The EUT was powered from a 4.0 V DC supply.

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standard or test plan were made during testing.

1.7 MODIFICATION RECORD

Modification 0 - No modifications were made to the test sample during testing.

Product Service

SECTION 2

TEST DETAILS

FCC Testing of the
Sharp CDMA SHI15 Dual Band CDMA (BC0 and BC6) and Tri Band GSM (900, 1800 and 1900 MHz) Dual Mode Cellular Phone with Bluetooth, FeliCa, WLAN and GPS
In accordance with FCC CFR 47 Part 15C

2.1 FIELD STRENGTH OF ANY EMISSION

2.1.1 Specification Reference

FCC CFR 47 Part 15C, Clause 15.225 (a)(b)(c)(d)

2.1.2 Equipment Under Test and Modification State

CDMA SHI15 S/N: IMEI 004401114000207 - Modification State 0

2.1.3 Date of Test

23 May 2012

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Procedure

The EUT was placed on a remotely controlled turntable within a semi-anechoic chamber. Measurements of the carrier frequency from the EUT were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

2.1.6 Environmental Conditions

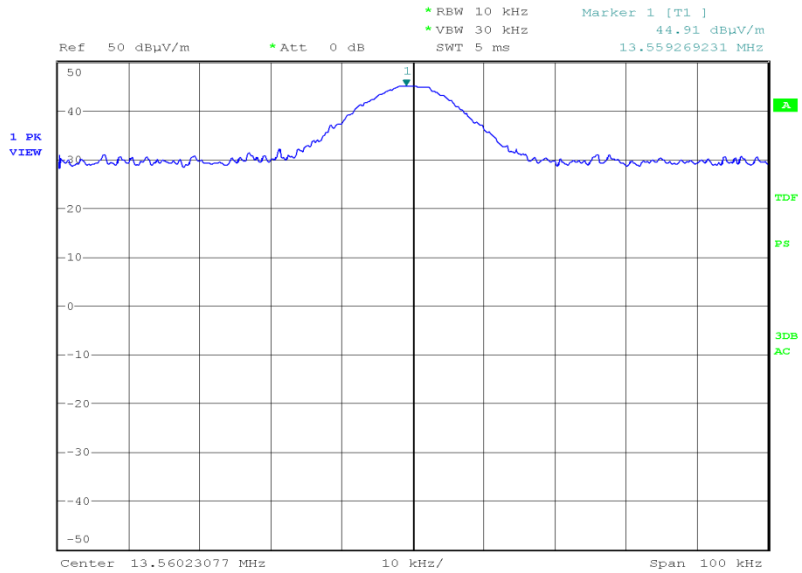
Ambient Temperature	19.8°C
Relative Humidity	59.0%

Product Service

2.1.7 Test Results

4.0 V DC Supply

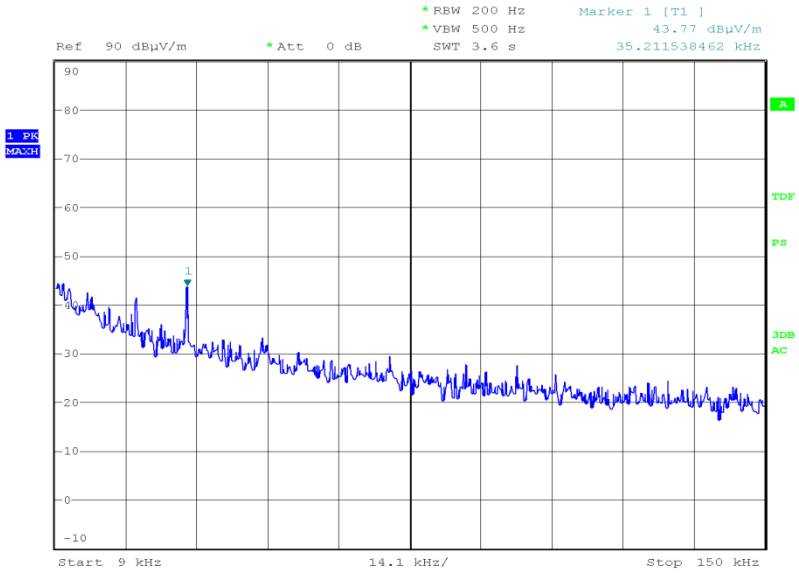
Carrier



Date: 23.MAY.2012 18:35:45

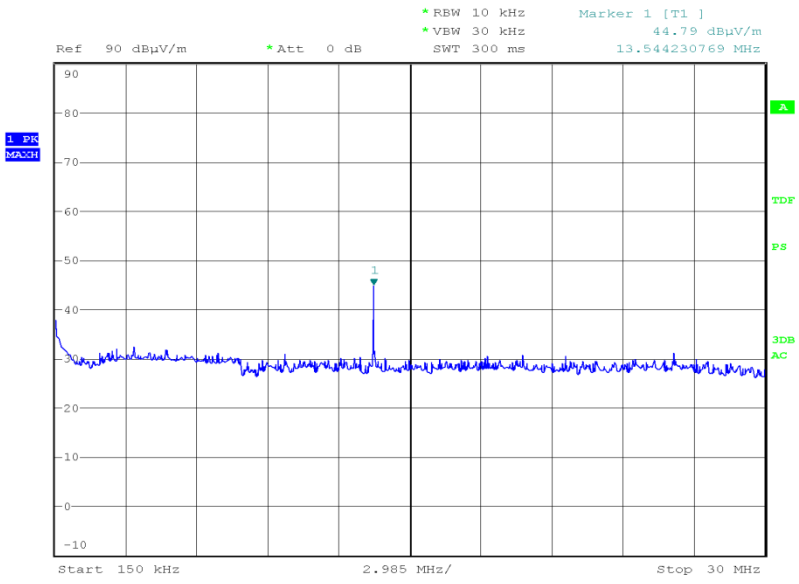
Frequency (MHz)	QP Level (dBµV/m) at 3m	QP Level (µV/m) at 3m	QP Limit (dBµV/m) at 30m	QP Limit (µV/m) at 30m	Angle (deg)	Height (m)	Polarity
13.56	44.51	168.07	84.0	15848.93	008	1.50	Face On

9 kHz to 150 kHz



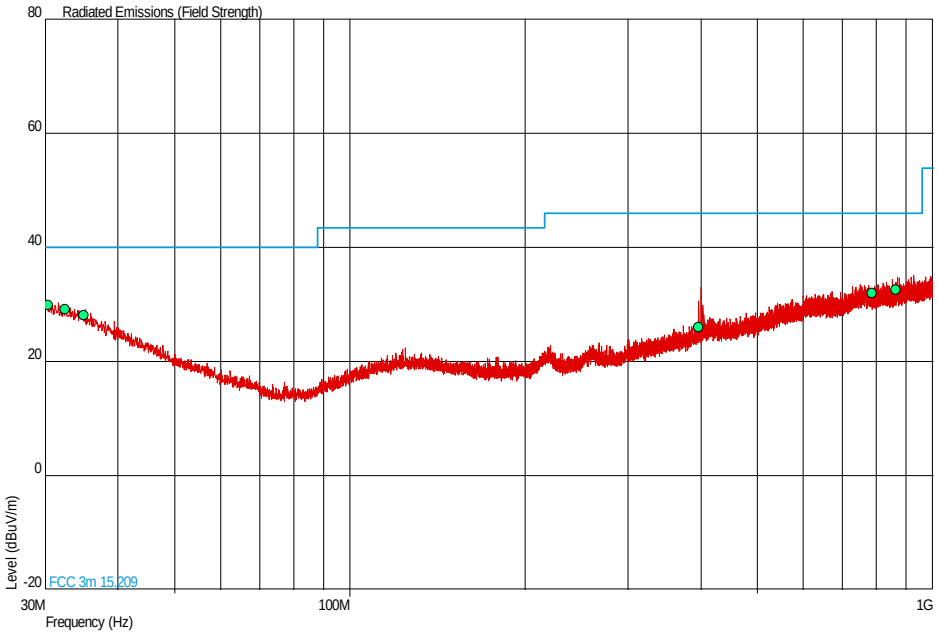
Date: 23.MAY.2012 18:31:15

150 kHz to 30 MHz



Date: 23.MAY.2012 18:32:25

30 MHz to 1 GHz



Frequency (MHz)	QP Level (dBµV/m)	QP Level (µV/m)	QP Limit (dBµV/m)	QP Limit (µV/m)	QP Margin (dBµV/m)	QP Margin (µV/m)	Angle (Deg)	Height (m)	Polarity
30.388	30.0	31.6	40.0	100	-10.0	68.4	270	1.00	Vertical
32.425	29.2	28.8	40.0	100	-10.8	71.2	0	0.00	Vertical
34.996	28.1	25.4	40.0	100	-11.9	74.6	0	0.00	Vertical
396.903	26.0	20.0	46.0	200	-20.0	180.0	315	1.00	Vertical
785.194	32.1	40.3	46.0	200	-13.9	159.7	45	1.00	Vertical
863.715	32.6	42.7	46.0	200	-13.4	157.3	90	1.00	Vertical

2.2 OCCUPIED BANDWIDTH

2.2.1 Specification Reference

FCC CFR 47 Part 15C, Clause 15.225, 15.215 (c)

2.2.2 Equipment Under Test and Modification State

CDMA SHI15 S/N: IMEI 004401114000207 - Modification State 0

2.2.3 Date of Test

19 June 2012

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Procedure

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 15C and ANSI C63.10.

The EUT was transmitting at maximum power, at all data rates via a cable to the Spectrum Analyser. The Analyser settings were adjusted to display the resultant trace on screen. The peak point of the trace was measured and the markers positioned to give the -20dBc points of the displayed spectrum. The test was performed with an unmodulated carrier.

The plot of the following pages shows the resultant display from the Spectrum Analyser.

2.2.6 Environmental Conditions

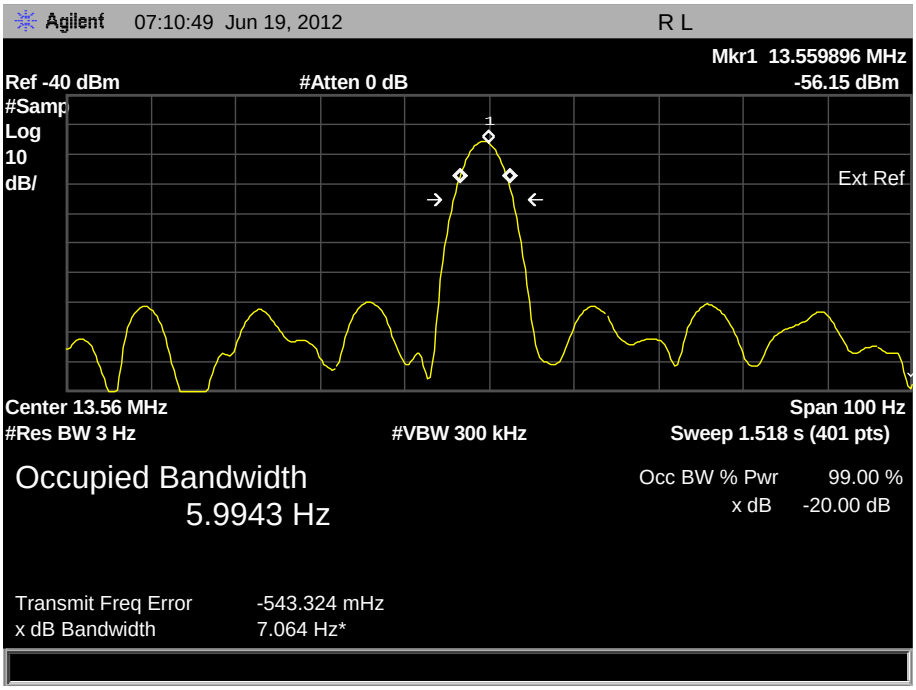
Ambient Temperature	22.4°C
Relative Humidity	38.4%

Product Service

2.2.7 Test Results

4.0 V DC Supply

Frequency (MHz)	20 dB Bandwidth (Hz)
13.56	7.064



2.3 FREQUENCY STABILITY UNDER TEMPERATURE VARIATIONS

2.3.1 Specification Reference

FCC CFR 47 Part 15C, Clause 15.225 (e)

2.3.2 Equipment Under Test and Modification State

CDMA SHI15 S/N: IMEI 004401114000207 - Modification State 0

2.3.3 Date of Test

19 June 2012

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Test Procedure

The EUT was set to transmit on maximum power with normal modulation. An frequency counter, was used to measure the frequency error. The temperature was adjusted between -20°C and +50°C in 10° steps as per 15.225 (e).

2.3.6 Environmental Conditions

Ambient Temperature	24.6°C
Relative Humidity	44.2%

Product Service

2.3.7 Test Results

4.0 V DC Supply

RFID

Temperature Interval (°C)	Test Frequency (MHz)	Deviation (%)
-20	13.56	0.0003
-10	13.56	0.0002
0	13.56	0.00004
+10	13.56	0.0002
+20	13.56	-0.0001
+20	13.56	0.0005
+20	13.56	0.0005
-30	13.56	0.0004
+30	13.56	0.0009
+40	13.56	0.0014
+50	13.56	0.0018

Limit Clause

The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency.

Product Service

SECTION 3

TEST EQUIPMENT USED

Product Service

3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.1 – Field Strength of any Emission					
Antenna (Double Ridge Guide)	Link Microtek Ltd	AM180HA-K-TU2	230	24	13-Sep-2013
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	8-Dec-2012
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	12	14-Nov-2012
Antenna (Active Loop, 9kHz-30MHz)	Rohde & Schwarz	HFH2-Z2	333	24	20-Sep-2012
Antenna (Dish/Tripod/Adaptor, 1GHz-18GHz)	Rohde & Schwarz	AC-008	334	-	TU
Antenna (Double Ridge Guide)	Q-Par Angus Ltd	QSH 180K	1511	24	2-Aug-2012
Pre-Amplifier	Phase One	PS04-0086	1533	12	20-Sep-2012
Pre-Amplifier	Phase One	PSO4-0087	1534	12	26-Sep-2012
Screened Room (5)	Rainford	Rainford	1545	36	3-Feb-2014
Mast Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	12-May-2013
Signal Generator: 10MHz to 20GHz	Rohde & Schwarz	SMR20	3475	12	20-Dec-2012
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	29-Sep-2012
3 GHz High Pass Filter	K&L Microwave	11SH10-3000/X18000-O/O	3552	12	16-Apr-2013
7m Armoured RF Cable	SSI Cable Corp.	1501-13-13-7m WA(-)	3600	-	TU
'2.92mm' - '2.92mm' RF Cable (2m)	Rhophase	KPS-1503-2000-KPS	3694	-	TU
'2.92mm' - '2.92mm' RF Cable (2m)	Rhophase	KPS-1503-2000-KPS	3695	-	TU
'3.5mm' - '3.5mm' RF Cable (2m)	Rhophase	3PS-1803-2000-3PS	3702	12	27-Jan-2013
'3.5mm' - '3.5mm' RF Cable (2m)	Rhophase	3PS-1803-2000-3PS	3703	-	TU
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	12	26-Aug-2012
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	maturo Gmbh	NCD	3917	-	TU
Low Noise Amplifier	Wright Technologies	APS04-0085	3969	12	8-Jul-2012

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.2 - Occupied Bandwidth					
Dual programable power supply	Thurlby	T-1000	418	-	TU
Multimeter	Fluke	75 Mk3	455	12	16-Jan-2013
Attenuator (10dB, 10W)	Weinschel	23-10-34	470	12	23-Jun-2012
Attenuator (10dB)	Weinschel	47-10-34	481	12	27-Mar-2013
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	21-Sep-2012
Power Divider	Weinschel	1506A	604	12	19-Mar-2013
Power Splitter	Weinschel	1506A	606	12	19-Dec-2012
Spectrum Analyser	Hewlett Packard	E4407B	1154	12	28-Jun-2012
GPS Frequency Standard	Rapco	GPS-804/3	1312	12	13-Sep-2012
Rubidium Standard	Rohde & Schwarz	XSRM	1316	12	13-Sep-2012
Hygromer	Rotronic	A1	2677	12	7-Feb-2013
Radio Communications Test Set	Rohde & Schwarz	CMU 200	3035	12	7-Oct-2012
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	13-Mar-2013
'3.5mm' - '3.5mm' RF Cable (1m)	Rhophase	3PS-1803-1000-3PS	3696	12	27-Jan-2013
DC - 12.4 GHz 10 dB Attenuator	Suhner	6810.17.A	3965	12	24-Jun-2012
True RMS Multimeter	Fluke	179	4007	12	16-Feb-2013
Temperature Humidity Meter	Radio Spares	1260	4020	12	23-Nov-2012
Section 2.3 - Frequency Stability under Temperature Variations					
Climatic Chamber	Votsch	VT4002	161	-	O/P Mon
Digital Temperature Indicator + T/C	Fluke	51	412	12	6-Jan-2013
Dual programable power supply	Thurlby	T-1000	418	-	TU
Multimeter	Fluke	75 Mk3	455	12	16-Jan-2013
Spectrum Analyser	Hewlett Packard	E4407B	1154	12	28-Jun-2012
GPS Frequency Standard	Rapco	GPS-804/3	1312	12	13-Sep-2012
Rubidium Standard	Rohde & Schwarz	XSRM	1316	12	13-Sep-2012
Hygromer	Rotronic	A1	2677	12	7-Feb-2013
Temperature Humidy Meter	Radio Spares	1260	4020	12	23-Nov-2012

TU – Traceability Unscheduled
O/P MON – Output Monitored with Calibrated Equipment

3.2 MEASUREMENT UNCERTAINTY

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

Test Discipline	MU
Frequency Stability Under Temperature Variations	± 3.54 Hz
Field Strength of any Emission	9 kHz to 1 GHz: ± 5.1 dB
Occupied Bandwidth	± 16.74 kHz

Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 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).