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Report On

FCC Testing of the Sharp CDMA SHI16 Dual Band CDMA (BC0 and BC6) and Tri Band GSM (900, 1800 and 1900 MHz) and Dual Band UMTS (FDD I and V) Multi Mode Cellular Phone with Bluetooth, WLAN, WiMAX, NFC (FeliCa) and GPS

In accordance with FCC CFR 47 Part 15C

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FCC ID: APYHRO00172

Document 75917214 Report 09 Issue 1

May 2012



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REPORT ON

FCC Testing of the
Sharp CDMA SH116 Dual Band CDMA (BC0 and BC6) and Tri Band
GSM (900, 1800 and 1900 MHz) and Dual Band UMTS (FDD I and V)
Multi Mode Cellular Phone with Bluetooth, WLAN, WiMAX, NFC
(FeliCa) and GPS
In accordance with FCC CFR 47 Part 15C

Document 75917214 Report 09 Issue 1

May 2012

PREPARED FOR

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PREPARED BY

Natalie Bennett
Senior Administrator (Technical)

APPROVED BY

Mark Jenkins
Authorised Signatory

DATED

16 May 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

B Airs

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SECTION 1

REPORT SUMMARY

FCC Testing of the
Sharp CDMA SH16 Dual Band CDMA (BC0 and BC6) and Tri Band GSM (900, 1800 and 1900
MHz) and Dual Band UMTS (FDD I and V) Multi Mode Cellular Phone with Bluetooth, WLAN,
WiMAX, NFC (FeliCa) and GPS
In accordance with FCC CFR 47 Part 15C



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1.1 INTRODUCTION

The information contained in this report is intended to show verification of the FCC Testing of the Sharp CDMA SHI16 Dual Band CDMA (BC0 and BC6) and Tri Band GSM (900, 1800 and 1900 MHz) and Dual Band UMTS (FDD I and V) Multi Mode Cellular Phone with Bluetooth, WLAN, WiMAX, NFC (FeliCa) 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 SHI16
Serial Number(s)	004401113852665
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 15C (2011)
Incoming Release Date	Application Form 29 March 2012
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	9096 29 March 2012
Start of Test	29 April 2012
Finish of Test	4 May 2012
Name of Engineer(s)	G Lawler B Airs
Related Document(s)	ANSI C63.10: 2009



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	



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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			
<u>Equipment designator:</u>			
Model name/number	CDMA SHI16	Identification number	APYHRO00172
<u>Supply Voltage:</u>			
☐	AC mains	State AC voltage	and AC frequency Hz
☐	DC (external)	State DC voltage	and DC current A
☒	DC (internal)	State DC voltage ...3.8 V	and Battery type...Li-Ion.
<u>Frequency characteristics:</u>			
Frequency range	13.56MHz to 13.56MHz	Channel spacing	(if channelized)
Designated test frequencies:			
Bottom: MHz	Middle: MHz	Top:MHz	
<u>Power characteristics:</u>			
Maximum transmitter power	W	Minimum transmitter power	 W
		(if variable)	
☒	Continuous transmission (Type-B/F)		
☒	Intermittent transmission (Type-A)	State duty cycle	
If intermittent, can transmitter be set to continuous transmit test mode? Y/ N			
<u>Antenna characteristics:</u>			
☐	Antenna connector	State impedance	ohm
☐	Temporary antenna connector	State impedance	ohm
☒	Integral antenna	State gain	0 dBi
<u>Modulation characteristics:</u>			
☒	Amplitude (Type-A:100%, Type-B/F:10%)	☐	Other
☐	Frequency	Details:	
☐	Phase		
Can the transmitter operate un-modulated?		Y /N	
ITU Class of emission:			
<u>Extreme conditions:</u>			
Maximum temperature	60 °C	Minimum temperature	-20 °C
Maximum supply voltage	4.0 V	Minimum supply voltage	3.8 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 : 

Name : Toshiro Shiomi

Position held : Manager

Date : 29 March, 2012



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1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Sharp CDMA SHI16 Dual Band CDMA (BC0 and BC6) and Tri Band GSM (900, 1800 and 1900 MHz) and Dual Band UMTS (FDD I and V) Multi Mode Cellular Phone with Bluetooth, WLAN, WiMAX, NFC (FeliCa) 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.



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SECTION 2

TEST DETAILS

FCC Testing of the
Sharp CDMA SH116 Dual Band CDMA (BC0 and BC6) and Tri Band GSM (900, 1800 and 1900
MHz) and Dual Band UMTS (FDD I and V) Multi Mode Cellular Phone with Bluetooth, WLAN,
WiMAX, NFC (FeliCa) and GPS
In accordance with FCC CFR 47 Part 15C



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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 SHI16 S/N: IMEI 004401113852665 - Modification State 0

2.1.3 Date of Test

29 April 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	18.8°C
Relative Humidity	37.0%

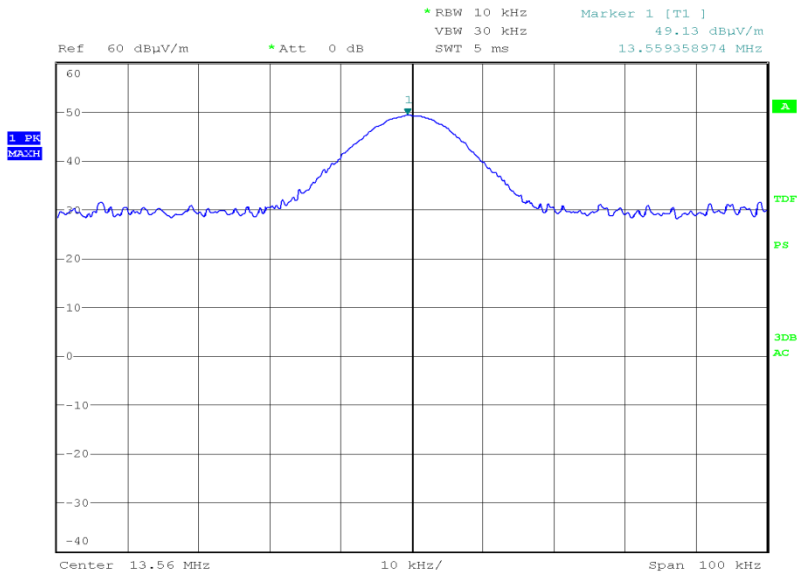


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2.1.7 Test Results

4.0 V DC Supply

Carrier



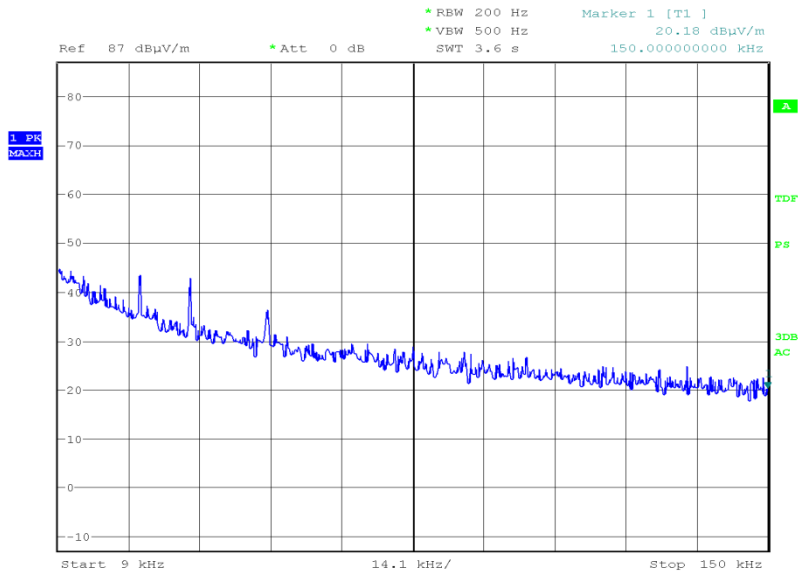
Date: 29.APR.2012 11:12:42

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	48.70	272.27	84.00	15848	197	1.5	Face On



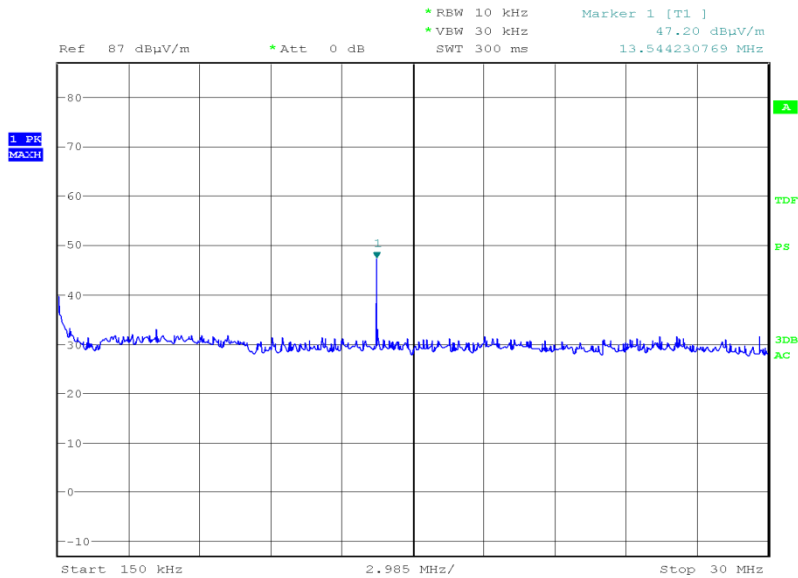
Product Service

9 kHz to 150 kHz



Date: 29.APR.2012 11:37:37

150 kHz to 30 MHz

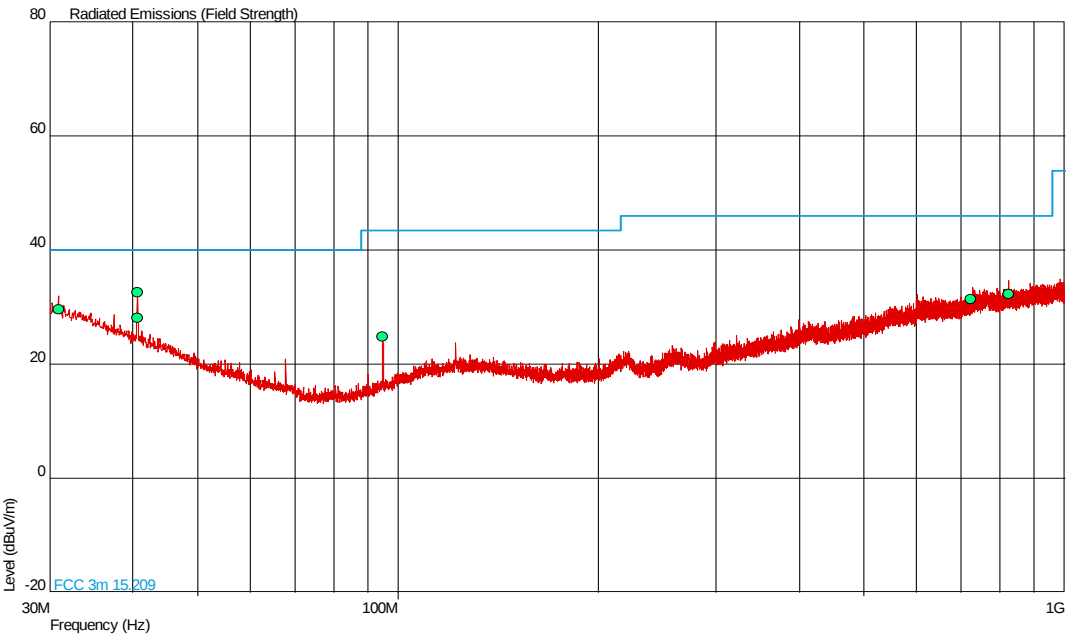


Date: 29.APR.2012 11:40:48



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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
30.950	29.7	30.5	40.0	100	-10.3	69.5	189	1.00	Horizontal
40.682	32.6	42.7	40.0	100	-7.4	57.3	267	1.15	Vertical
40.685	28.1	25.4	40.0	100	-11.9	74.6	140	1.52	Horizontal
94.922	24.8	17.4	43.5	150	-18.7	132.6	169	1.08	Vertical
722.268	31.3	36.7	46.0	200	-14.7	163.3	113	1.00	Horizontal
823.213	32.3	41.2	46.0	200	-13.7	158.8	225	1.00	Vertical



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2.2 OCCUPIED BANDWIDTH

2.2.1 Specification Reference

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

2.2.2 Equipment Under Test and Modification State

CDMA SHI16 S/N: IMEI 004401113852665 - Modification State 0

2.2.3 Date of Test

3 May 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	23.9°C
Relative Humidity	34.7%

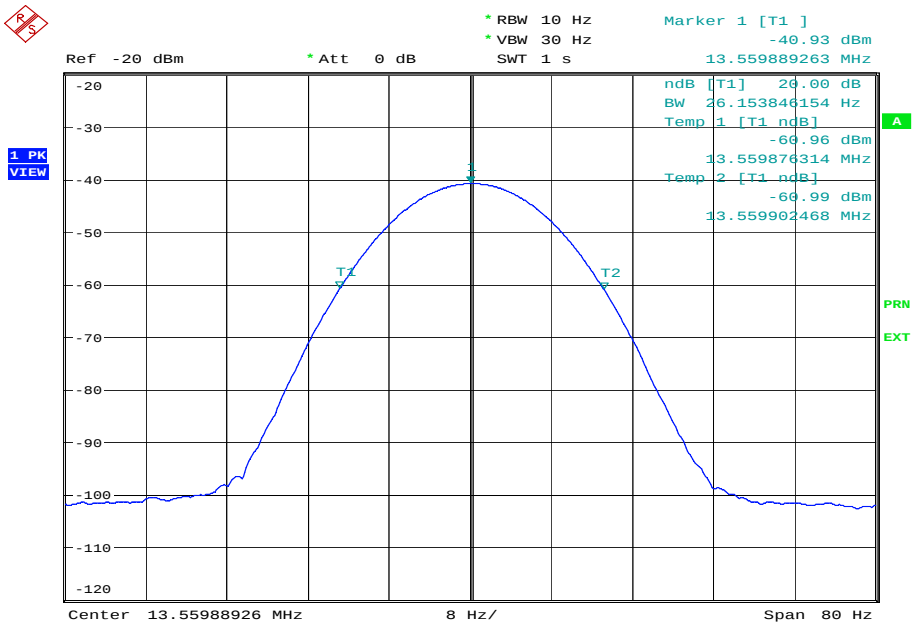


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2.2.7 Test Results

4.0 V DC Supply

Frequency (MHz)	20 dB Bandwidth (Hz)
13.56	26.154



Date: 3.MAY.2012 16:07:27



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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 SHI16 S/N: IMEI 004401113852665 - Modification State 0

2.3.3 Date of Test

4 May 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	24.2°C
Relative Humidity	29.9%



2.3.7 Test Results

4.0 V DC Supply

RFID

Temperature Interval (°C)	Test Frequency (MHz)	Deviation (%)
-20	13.56	-0.000435
-10	13.56	-0.000258
0	13.56	-0.000052
+10	13.56	0.004580
+20	13.56	-0.000826
+20	13.56	-0.000819
+20	13.56	-0.000819
+30	13.56	-0.001084
+40	13.56	-0.001438
+50	13.56	-0.001822
+60	13.56	-0.001976

Limit Clause

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency.



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SECTION 3

TEST EQUIPMENT USED



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					
Radiocommunications Tester	Rohde & Schwarz	CMU 200	39	12	9-Dec-2012
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
Pre-Amplifier	Phase One	PS04-0086	1533	12	20-Sep-2012
Pre-Amplifier	Phase One	PS04-0087	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 40GHz)	Rohde & Schwarz	SMR40	3171	12	22-Aug-2012
High Pass Filter (3GHz)	RLC Electronics	F-100-3000-5-R	3349	12	27-May-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
'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
Section 2.2- Occupied Bandwidth					
Dual programable power supply	Thurlby	T-1000	418	-	TU
Rubidium Standard	Rohde & Schwarz	XRSM	1316	12	13-Sep-2012
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	18-Nov-2012
Hygrometer	Rotronic	I-1000	2891	12	3-May-2012
DC - 12.4 GHz 10 dB Attenuator	Suhner	6810.17.A	3965	12	24-Jun-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
Rubidium Standard	Rohde & Schwarz	XRSM	1316	12	13-Sep-2012
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	18-Nov-2012
Hygrometer	Rotronic	7867050	2677	12	7-Feb-2013
True RMS Multimeter	Fluke	179	4007	12	16-Feb-2013

TU – Traceability Unscheduled

O/P MON – Output Monitored with Calibrated Equipment



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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



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SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



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4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



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

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Results of tests not covered by our UKAS Accreditation Schedule are marked NUA
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