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Report On

Limited FCC Testing of the Sharp CDMA SHL21 Dual Band CDMA (BC0 and BC6) and Tri Band GSM (900, 1800 and 1900 MHz) and Dual Band UMTS (FDD I and V) and Dual Band LTE (B11 and B18) Multi Mode Cellular Phone with Bluetooth, WLAN, NFC (FeliCa) and GPS In accordance with FCC CFR 47 Part 15C (FeliCa)

COMMERCIAL-IN-CONFIDENCE

FCC ID: APYHRO00178

Document 75918726 Report 11 Issue 1 October 2012

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REPORT ON

Limited FCC Testing of the
Sharp CDMA SHL21 Dual Band CDMA (BC0 and BC6) and Tri Band GSM (900, 1800 and 1900 MHz) and Dual Band UMTS (FDD I and V) and Dual Band LTE (B11 and B18) Multi Mode Cellular Phone with Bluetooth, WLAN, NFC (FeliCa) and GPS
In accordance with FCC CFR 47 Part 15C (FeliCa)

Document 75918726 Report 11 Issue 1

October 2012

PREPARED FOR

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PREPARED BY

Natalie Bennett
Senior Administrator (Technical)

APPROVED BY

Mark Jenkins
Authorised Signatory

DATED 02 October 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 M Russell

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CONTENTS

Product Service

SECTION 1

REPORT SUMMARY

Limited FCC Testing of the
Sharp CDMA SHL21 Dual Band CDMA (BC0 and BC6) and Tri Band GSM (900, 1800 and 1900 MHz) and Dual Band UMTS (FDD I and V) and Dual Band LTE (B11 and B18) Multi Mode Cellular Phone with Bluetooth, WLAN, NFC (FeliCa) and GPS
In accordance with FCC CFR 47 Part 15C (FeliCa)

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Limited FCC Testing of the Sharp CDMA SHL21 Dual Band CDMA (BC0 and BC6) and Tri Band GSM (900, 1800 and 1900 MHz) and Dual Band UMTS (FDD I and V) and Dual Band LTE (B11 and B18) Multi Mode Cellular Phone with Bluetooth, WLAN, NFC (FeliCa) and GPS to the requirements of FCC CFR 47 Part 15C.

Objective	To perform Limited 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 SHL21
Serial Number(s)	IMEI 004401114094648
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 15C (2011)
Incoming Release Date	Application Form 30 July 2012
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	9290 03 August 2012
Start of Test	14 August 2012
Finish of Test	19 September 2012
Name of Engineer(s)	G Lawler M Russell
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 SHL21 Identification number APYHRO00178

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 (Type-B/F)	
[X]	Intermittent transmission (Type-A)	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 (Type-A:100%, Type-B/F:10%)	[ ]	Other
[ ]	Frequency	Details: ……..	
[ ]	Phase		

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

Extreme conditions:
Maximum temperature 55 ºC Minimum temperature -10 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 : 

Name : Masahiko Kishino
Position held : Manager
Date : 30 July 2012

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Sharp CDMA SHL21 Dual Band CDMA (BC0 and BC6) and Tri Band GSM (900, 1800 and 1900 MHz) and Dual Band UMTS (FDD I and V) and Dual Band LTE (B11 and B18) Multi Mode Cellular Phone with Bluetooth, WLAN, 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.

Product Service

SECTION 2

TEST DETAILS

Limited FCC Testing of the
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In accordance with FCC CFR 47 Part 15C (FeliCa)

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 SHL21 S/N: IMEI 004401114094648 - Modification State 0

2.1.3 Date of Test

19 September 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

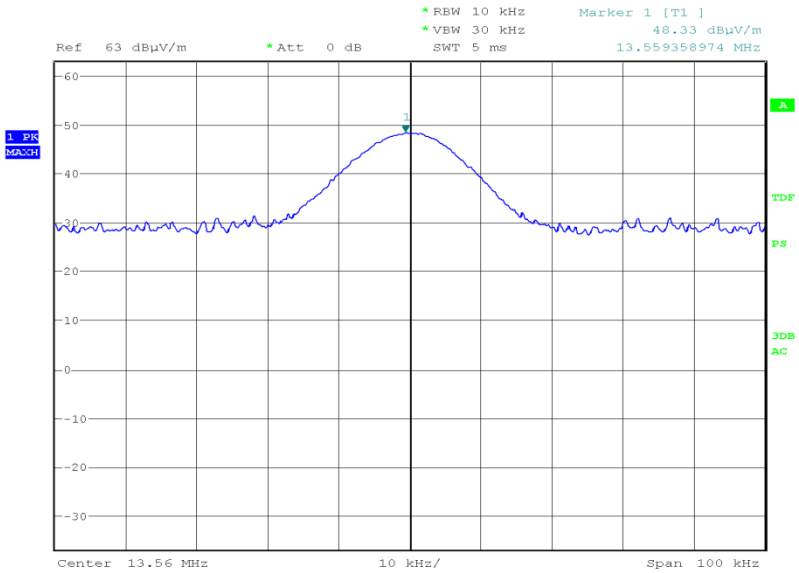
Ambient Temperature	19.4°C
Relative Humidity	37.0%

Product Service

2.1.7 Test Results

4.0 V DC Supply

Carrier

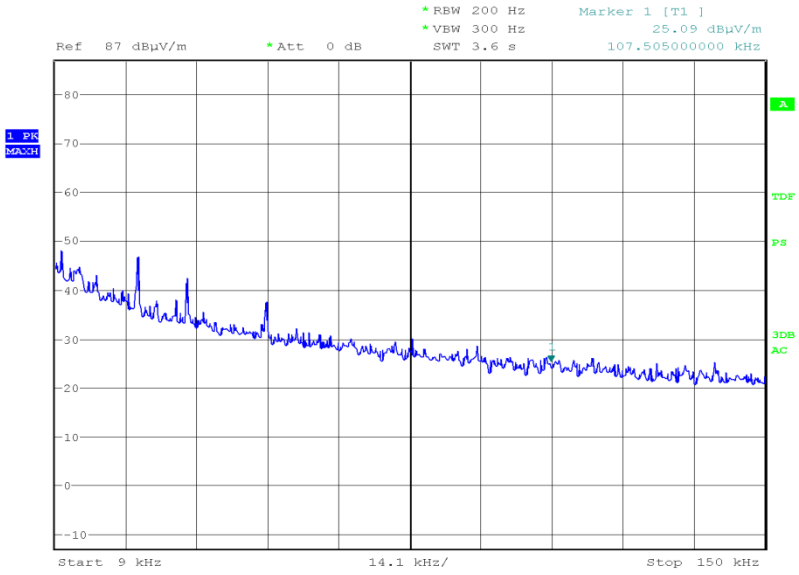


Date: 19.SEP.2012 20:04:31

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	48.33	260.92	84.00	15848	084	1.50	Edge On

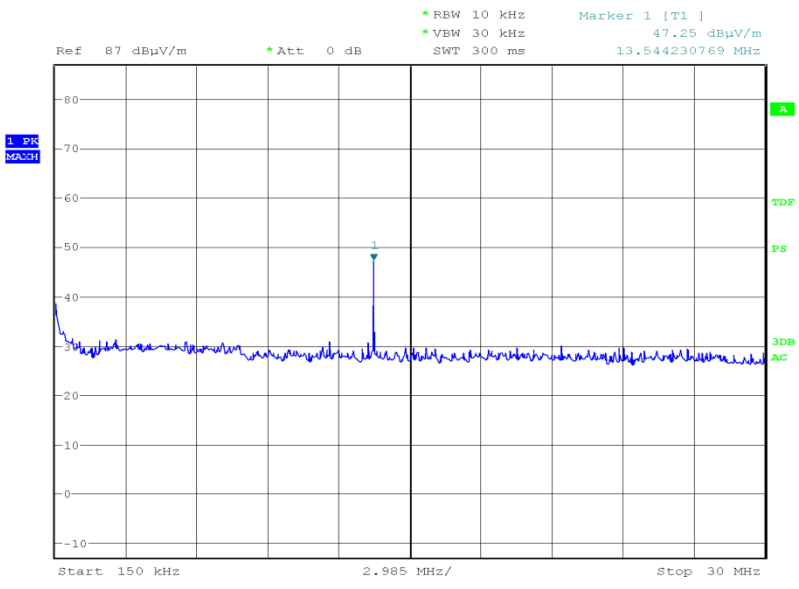
Product Service

9 kHz to 150 kHz



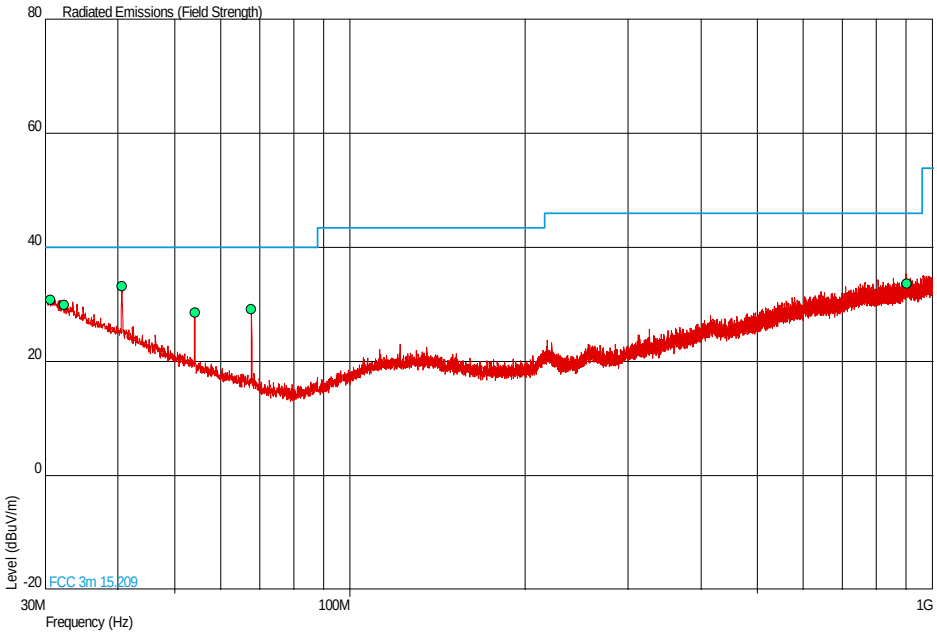
Date: 19.SEP.2012 19:42:30

150 kHz to 30 MHz



Date: 19.SEP.2012 19:15:22

30 MHz to 1 GHz



Frequency (MHz)	QP Level (dBuV/m)	QP Level (uV/m)	QP Limit (dBuV/m)	QP Limit (uV/m)	QP Margin (dBuV/m)	QP Margin (uV/m)	Angle (Deg)	Height (m)	Polarity
30.663	30.9	35.1	40.0	100	-9.1	64.9	346	1.00	Vertical
32.408	29.9	31.3	40.0	100	-10.1	68.7	0	2.47	Vertical
40.678	33.2	45.7	40.0	100	-6.8	54.3	85	1.00	Vertical
54.260	28.6	26.9	40.0	100	-11.4	73.1	126	1.25	Vertical
67.795	29.2	28.8	40.0	100	-10.8	71.2	56	1.26	Vertical
903.420	33.7	48.4	46.0	200	-12.3	151.6	360	1.00	Horizontal

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 SHL21 S/N: IMEI 004401114094648 - Modification State 0

2.2.3 Date of Test

20 August 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.

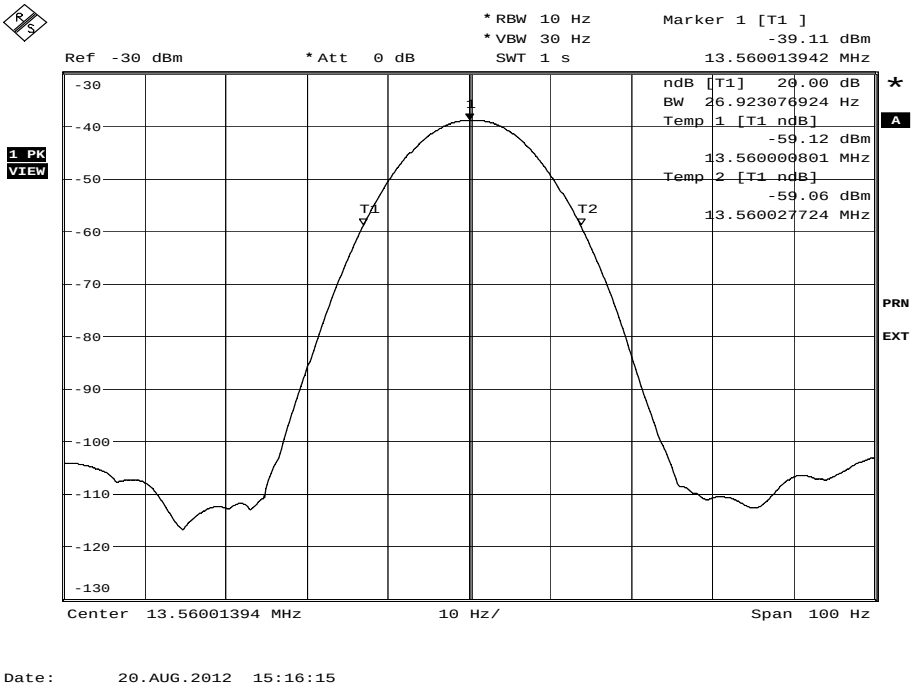
2.2.6 Environmental Conditions

Ambient Temperature	22.4°C
Relative Humidity	46.1%

2.2.7 Test Results

4.0 V DC Supply

Frequency (MHz)	20 dB Bandwidth (Hz)
13.56	26.9230



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 SHL21 S/N: IMEI 004401114094648 - Modification State 0

2.3.3 Date of Test

24 August 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	19.2°C
Relative Humidity	54.1%

Product Service

2.3.7 Test Results

4.0 V DC Supply

RFID

Temperature Interval (°C)	Test Frequency (MHz)	Deviation (%)
-20	13.56	0.000383481
-10	13.56	0.000693215
0	13.56	0.000862832
+10	13.56	0.000862832
+20	13.56	0.000412979
+30	13.56	-0.000058997
+40	13.56	-0.000538348
+50	13.56	-0.001135693

Equipment is battery operated therefore a new battery was used as per part 15.225(e) therefore voltage variation measurements are not required.

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	235	12	14-Nov-2012
Antenna (Active Loop, 9kHz-30MHz)	Rohde & Schwarz	HFH2-Z2	333	24	20-Sep-2012
Filter (High Pass)	Lorch	SHP7-7000-SR	566	12	20-Feb-2013
Antenna (Double Ridge Guide)	Q-Par Angus Ltd	QSH 180K	1511	-	TU
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	25-Dec-2013
Signal Generator (1GHz to 40GHz)	Rohde & Schwarz	SMR40	1589	12	11-Nov-2012
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
High Pass Filter (4GHz)	RLC Electronics	F-100-4000-5-R	2773	12	20-Sep-2012
Antenna (Bilog)	Chase	CBL6143	2904	24	12-May-2013
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	3171	12	30-Aug-2013
High Pass Filter (3GHz)	RLC Electronics	F-100-3000-5-R	3349	12	29-May-2013
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
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	-	TU
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	-	TU
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	4144	-	01-May-2013

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.2 - Occupied Bandwidth					
Power Meter	Rohde & Schwarz	NRV	52	-	TU
True RMS Multimeter	Fluke	79 Series III	411	12	25-Jul-2013
RF Coupler	TUV SUD Product Service	TÜV	415	-	TU
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	21-Sep-2012
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	19-Jan-2013
Programmable Power Supply	Iso-tech	IPS 2010	2438	-	O/P Mon
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	18-Nov-2012
Hygrometer	Rotronic	I-1000	2891	12	21-May-2013
Signal Generator: 10MHz to 20GHz	Rohde & Schwarz	SMR20	3475	12	20-Dec-2012
Combiner/Splitter	Weinschel	1506A	3879	12	19-Mar-2013
DC - 12.4 GHz 10 dB Attenuator	Suhner	6810.17.A	3965	12	27-Jun-2013
P-Series Power Meter	Agilent	N1911A	3980	12	12-Sep-2012
50 MHz-18 GHz Wideband Power Sensor	Agilent	N1921A	3982	12	12-Sep-2012
Section 2.3 - Frequency Stability Under Temperature Variations					
Digital Temperature Indicator + T/C	Fluke	51	412	12	6-Jan-2013
RF Coupler	TUV SUD Product Service	TÜV	415	-	TU
Temperature Chamber	Montford	2F3	467	-	O/P Mon
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	19-Jan-2013
Hygrometer	Rotronic	I-1000	3220	12	13-Jun-2013
ESA-E Series Spectrum Analyser	Agilent	E4402B	3348	12	14-Jun-2013

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).