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Report On

FCC Testing of the
Sharp SH111 Tri Band CDMA (BC0/BC3, BC6) Cellular Phone with
Bluetooth, WLAN & FeliCa and GPS

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FCC ID: APYHRO0049

Document 75913699 Report 09 Issue 1

June 2011



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Sharp SH11 Tri Band CDMA (BC0/BC3, BC6) Cellular Phone with
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PREPARED FOR

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PREPARED BY

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APPROVED BY

M Jenkins
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DATED

11 June 2011

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 15.225. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

R Henley

T Hubbard





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SECTION 1

REPORT SUMMARY

FCC Testing of the
Sharp SHI11 Tri Band CDMA (BC0/BC3, BC6) Cellular Phone with Bluetooth, WLAN & FeliCa
and GPS



1.1 INTRODUCTION

The information contained in this report is intended to show verification of Sharp SHI11 Tri Band CDMA (BC0/BC3, BC6) Cellular Phone with Bluetooth, WLAN & FeliCa and GPS to the requirements of FCC CFR 47 Part 15.255.

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)	SHI11
Serial Number(s)	SSHFA000945
Software Version	A4010
Hardware Version	PP1
Number of Samples Tested	One
Test Specification/Issue/Date	FCC CFR 47 Part 15: 2010
Incoming Release Date	Application Form 10 June 2011
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	8492 14 April 2011
Start of Test	9 June 2011
Finish of Test	10 June 2011
Name of Engineer(s)	R Henley T Hubbard
Related Document(s)	ANSI C63.4: 2003



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1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results for each configuration, in accordance with FCC CFR 47 Part 15.255 is shown below.

Configuration 1: Handset						
Section	Spec Clause	Test Description	Mode	Mod State	Result	Base Standard
2.1	15.225	EIRP Peak Power	Active	0	Pass	ANSI C63.4
2.2	15.225	Occupied Bandwidth	Active	0	Pass	ANSI C63.4
2.3	15.225	Frequency Stability Under Temperature Variations	Active	0	Pass	ANSI C63.4

N/A – Not Applicable

**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 SHI11	Identification number	APYHRO00149
<u>Supply Voltage:</u>			
☐ []	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
<u>Frequency characteristics:</u>			
Frequency range	13.56 MHz to 13.56 MHz		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)	
☒ [X]	Continuous transmission		
☐ []	Intermittent transmission		
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	
☒ [X]	Integral antenna	State gain 0 dBi	
<u>Modulation characteristics:</u>			
☒ [X]	Amplitude		☐ [] Other
☐ []	Frequency		Details:
☐ []	Phase		
Can the transmitter operate un-modulated?		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	3.7 V



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1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was an Sharp SHI11 Tri Band CDMA (BC0/BC3, BC6) Cellular Phone with Bluetooth, WLAN & FeliCa and GPS. A full technical description can be found in the manufacturer's documentation.

1.4.2 Test Configuration

Configuration 1: Handset

The EUT was configured in accordance with FCC CFR 47 Part 15.225.

1.4.3 Modes of Operation

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

Mode 1 – Active

Information on the specific test modes utilised are detailed in the test procedure for each individual test.



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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 or test laboratories as appropriate.

The EUT was powered from either a 3.7 V DC Supply.

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

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

1.7 MODIFICATION RECORD

No modifications were made to the EUT during testing.



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SECTION 2

TEST DETAILS

FCC Testing of the
Sharp SH111 Tri Band CDMA (BC0/BC3, BC6) Cellular Phone with Bluetooth, WLAN & FeliCa
and GPS



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2.1 EIRP PEAK POWER**2.1.1 Specification Reference**

FCC CFR 47 Part 15, Clause 15.225

2.1.2 Equipment Under Test

SHI11, S/N: SSHFA000945

2.1.3 Date of Test and Modification State

08 June 2011 - Modification State 0

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 Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 15.

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.

The measurement was performed with a peak detector and the trace set to max hold using a Resolution and Video bandwidth of 1 MHz.

A substitution was then performed by replacing the EUT with a substitution antenna and signal generator. The signal generator level was increased to achieve the same raw result as the EUT. Cable loss and antenna gain was included to obtain the result.

A wideband power metre was then used to apply a correction factor to achieve the final result.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1

2.1.6 Environmental Conditions

08 June 2011

Ambient Temperature 20.4°C

Relative Humidity 39%



2.1.7 Test Results

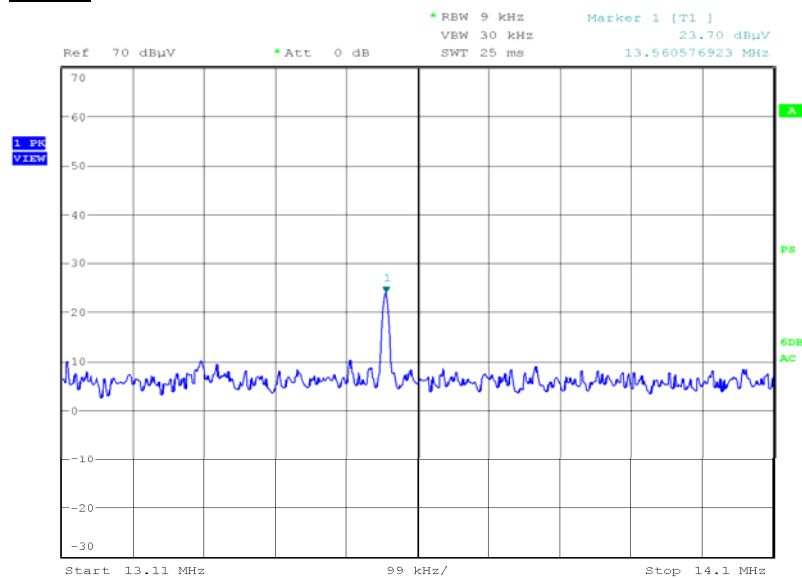
For the period of test the EUT met the requirements of FCC CFR 47 Part 15.225 for EIRP Peak Power.

The test results are shown below.

Configuration 1 - Mode 1

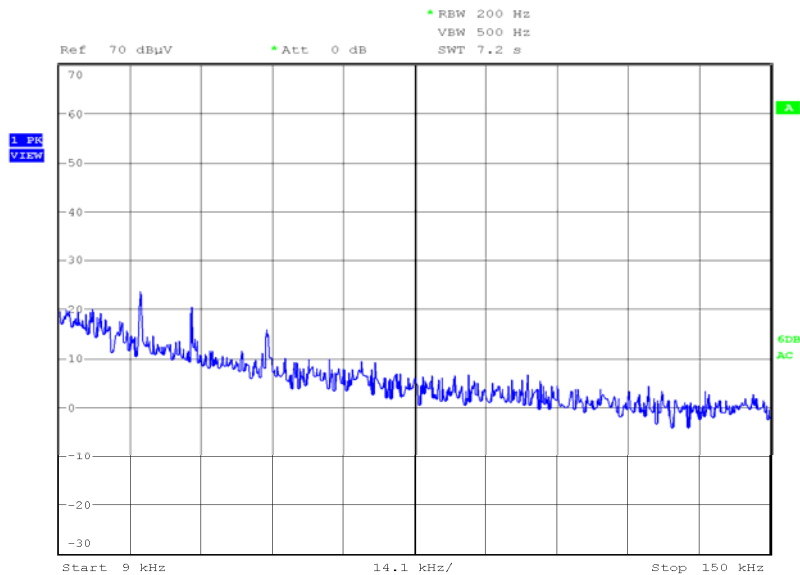
Note all measurements performed at 3m distance, for the frequency range 9kHz to 30MHz no extrapolation was calculated or applied as the emissions are below the limit.

Carrier



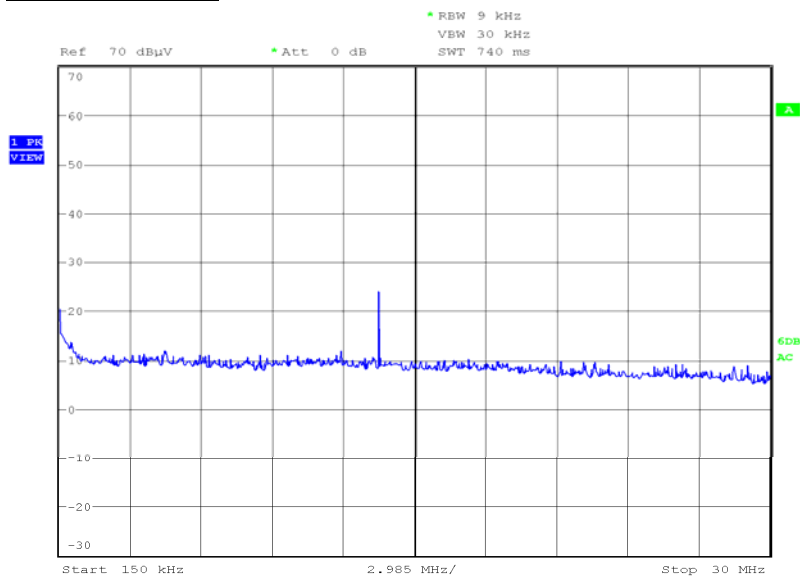
Date: 8.JUN.2011 17:19:44

Frequency (MHz)	QP Level (dBuV/m) at 3m	QP Level (uV/m) at 3m	QP Limit (dBuV/m) at 30m	QP Limit (uV/m) at 30m	Angle (Deg)	Height (m)	Polarity
13.560	38.85	87.6	84.0	15843	0	1.50	Face On

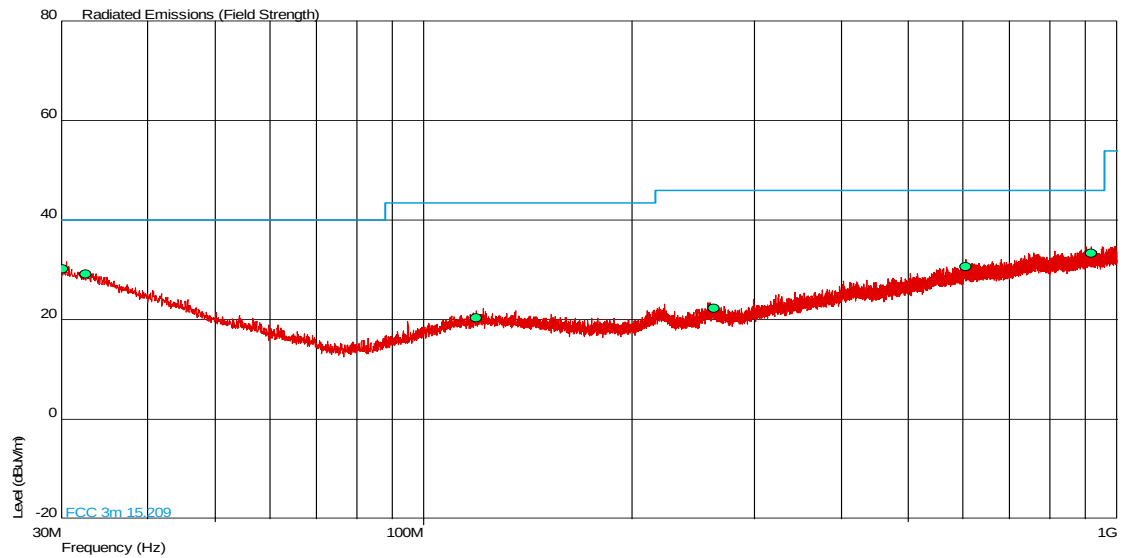
9kHz to 150kHz

Date: 8.JUN.2011 16:50:03

The emissions at 25.269kHz, 35.211kHz, 50.125kHz are ambients

150kHz to 30MHz

Date: 8.JUN.2011 16:52:58

30MHz to 1000MHz

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
30.146	30.3	32.7	40.0	100.0	-9.7	-67.3	193	2.53	Vertical
32.623	29.2	28.4	40.0	100.0	-10.8	-71.6	334	2.31	Vertical
119.240	20.4	10.5	43.5	150.0	-23.1	-139.5	170	1.00	Vertical
261.961	22.3	13.0	46.0	200.0	-23.7	-187.0	360	1.00	Vertical
606.141	30.6	33.9	46.0	200.0	-15.4	-166.1	0	1.00	Vertical
918.000	33.3	46.2	46.0	200.0	-12.7	-153.8	36	1.00	Vertical



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2.2 OCCUPIED BANDWIDTH

2.2.1 Specification Reference

FCC CFR 47 Part 15, Clause 22.917(b)

2.2.2 Equipment Under Test

SHI11, S/N: SSHFA000945

2.2.3 Date of Test and Modification State

9 June 2011 - Modification State 0

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 Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 15 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.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1

2.2.6 Environmental Conditions

10 June 2011

Ambient Temperature 22.3°C

Relative Humidity 32.3%



2.2.7 Test Results

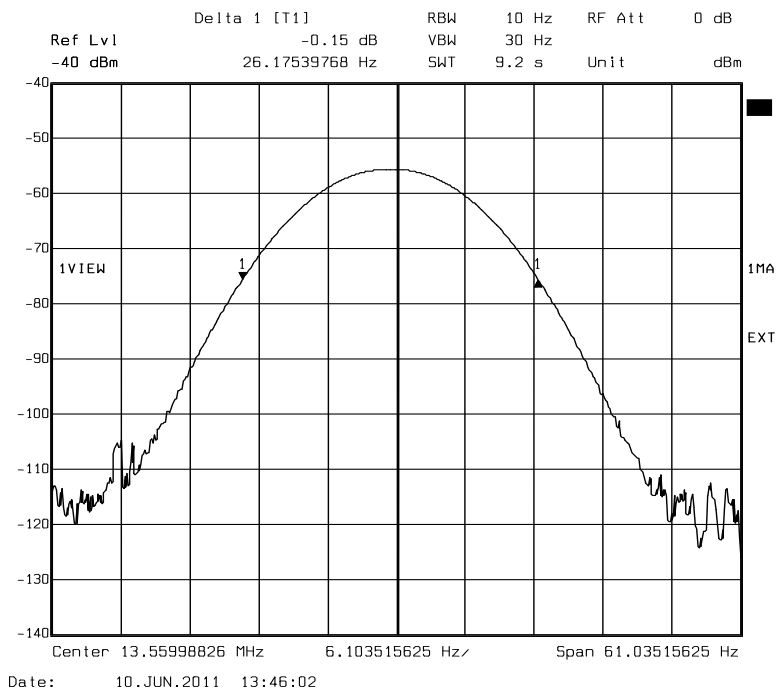
For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and 22 for Occupied Bandwidth.

The test results are shown below.

4 V DC Supply

Frequency (MHz)	20dB Bandwidth (Hz)
13.56	26.1754

Configuration 1 – Mode 1





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2.3 FREQUENCY STABILITY UNDER TEMPERATURE VARIATIONS

2.3.1 Specification Reference

FCC CFR 47 Part 15, Clause 15.225

2.3.2 Equipment Under Test

SHI11, S/N: SSHFA000945

2.3.3 Date of Test and Modification State

10 June 2011 - Modification State 0

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 Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 15.225(e).

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).

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1

2.3.6 Environmental Conditions

10 June 2011

Ambient Temperature 22.3°C

Relative Humidity 32.3%



2.3.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 15.225 for Frequency Stability Under Temperature Variations.

The test results are shown below.

Configuration 1 - Mode 1

4 V DC Supply

Temperature Interval (°C)	Test Frequency (MHz)	Test Voltage	Mode	Deviation (%)	Limit
-20	13.56	4.0	RFID	0.00077	±0.01%
-10	13.56	4.0	RFID	0.00114	±0.01%
0	13.56	4.0	RFID	0.00108	±0.01%
+10	13.56	4.0	RFID	0.00109	±0.01%
+20	13.56	4.0	RFID	0.00053	±0.01%
+20	13.56	4.0	RFID	0.00058	±0.01%
+20	13.56	4.0	RFID	0.00064	±0.01%
+30	13.56	4.0	RFID	0.00008	±0.01%
+40	13.56	4.0	RFID	0.00006	±0.01%
+50	13.56	4.0	RFID	0.00074	±0.01%

Limit Clause

The frequency tolerance of the carrier signal shall be maintained within ±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 - Maximum Output Power					
Peak Power Analyser	Hewlett Packard	8990A	107	12	11-Feb-2012
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	12-Nov-2011
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	12	12-Nov-2011
Antenna (Bilog)	Schaffner	CBL6143	287	24	19-Jan-2012
Screened Room (5)	Rainford	Rainford	1545	24	3-Feb-2014
Mast Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Power Sensor	Hewlett Packard	84812A	2743	-	TU
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	3171	12	12-Aug-2011
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	9-Sep-2011
7m Armoured RF Cable	SSI Cable Corp.	1501-13-13-7m WA(-)	3600	-	TU
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	12	10-Aug-2011
Tilt Antenna Mast	mature GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	mature GmbH	NCD	3917	-	TU
Section 2.2 - Occupied Bandwidth					
Spectrum Analyser	Rohde & Schwarz	FSEM	37	12	18-Apr-2012
Multimeter	White Gold	WG022	190	12	26-Oct-2011
DC Power Supply Unit	Hewlett Packard	6267B	294	-	O/P Mon
RF Coupler	TUV	T♦V	415	-	TU
Multimeter	Iso-tech	IDM-101	466	12	2-Mar-2012
Attenuator (10dB, 10W)	Weinschel	23-10-34	470	12	23-Jun-2011
Spectrum Analyser	Hewlett Packard	E4407B	1154	12	17-Jun-2011
Hygrometer	Rotronic	A1	1388	12	10-Jul-2011
Multimeter	Iso-tech	IDM101	2419	12	3-Sep-2011
Power Supply	Iso-tech	IPS 2010	2439	-	O/P Mon
Thermocouple Thermometer	Fluke	51	3172	12	12-Jul-2011
Hygrometer	Rotronic	I-1000	3220	12	3-May-2012
Power Meter	Rohde & Schwarz	NRP	3491	12	19-Apr-2012
Wideband Power Sensor, 50MHz - 18GHz	Rohde & Schwarz	NRP-Z81	3492	12	19-Apr-2012
Vector Signal Generator	Rohde & Schwarz	SMU 200A	3493	12	10-Aug-2011
Signal Generator, 9kHz to 3GHz	Rohde & Schwarz	SMA 100A	3494	12	25-Jan-2012
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	8-Feb-2012
'N' - 'N' RF Cable (1m)	Rhophase	NPS-1803-1000-NPS	3700	12	11-Jan-2012
Combiner/Splitter	Weinschel	1506A	3877	12	22-Feb-2012
Combiner/Splitter	Weinschel	1506A	3880	12	22-Feb-2012
Section 2.3 - Frequency Tolerance under Temperature Variations					
Spectrum Analyser	Rohde & Schwarz	FSEM	37	12	18-Apr-2012
Climatic Chamber	Votsch	VT4002	161	-	O/P Mon
Multimeter	White Gold	WG022	190	12	26-Oct-2011
DC Power Supply Unit	Hewlett Packard	6267B	294	-	O/P Mon
RF Coupler	TUV	T♦V	415	-	TU



Temperature Chamber	Montford	2F3	467	-	O/P Mon
Attenuator (10dB, 10W)	Weinschel	23-10-34	470	12	23-Jun-2011
Multimeter	Iso-tech	IDM101	2419	12	3-Sep-2011
Thermocouple Thermometer	Fluke	51	3172	12	12-Jul-2011
Hygrometer	Rotronic	I-1000	3220	12	3-May-2012
Signal Generator, 9kHz to 3GHz	Rohde & Schwarz	SMA 100A	3494	12	25-Jan-2012
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	8-Feb-2012
'N' - 'N' RF Cable (1m)	Rhophase	NPS- 1803- 1000-NPS	3700	12	11-Jan-2012
Combiner/Splitter	Weinschel	1506A	3880	12	22-Feb-2012

TU – Traceability Unscheduled

O/P Mon – Output monitored using calibrated equipment.



3.2 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*
Conducted Emissions, LISN	150kHz to 30MHz Amplitude	3.2dB*
Conducted Emissions, ISN	150kHz to 30MHz Amplitude	2.1dB
Substitution Antenna, Radiated Field	30MHz to 18GHz Amplitude	2.6dB
Discontinuous Interference	150kHz to 30MHz Amplitude	3.0dB*
Interference Power	30MHz to 300MHz Amplitude	3.0dB*
Radiated E-Field Susceptibility	10MHz to 6GHz Test Amplitude	2.0dB†
Conducted Susceptibility RF	50kHz to 1000MHz Amplitude	3.1dB•
	EM Clamp Method of Test	1.2dB•
	CDN Method of Test	1.1dB•
	BCI Clamp Method of Test	1.2dB•
Conducted Susceptibility LF	DC to 150kHz	1.0%†
Power Frequency Magnetic Field	50Hz/60Hz Amplitude	0.45%
Magnetic Emissions	9kHz to 30MHz Amplitude	3.4dB*
Magnetic Field/Flux iaw EN 50366	10Hz to 400kHz	2.64%
Harmonics and Flicker	The test was applied using proprietary equipment that meets the requirements of EN 61000-3-2 and EN 61000-3-3	—
Mains Voltage Variations and Interrupts	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-11	—
Fast Transient Burst	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-4	—
Electrostatic Discharge	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-2	—
Surge	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-5	—
Vehicle Transients	The test was applied using proprietary equipment that meets the requirements of ISO 7637-1 and 2	—
Compass Safe Distance	Azimuth Accuracy	0.10°
Channel Occupancy/Separation	19.1kHz	N/A
Maximum Output Power	Not Applicable	±0.5dB
Number of Channels	Not Applicable	N/A
20dB Bandwidth	19.1kHz	±0.5dB

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

- * In accordance with CISPR 16-4-2
- † In accordance with UKAS Lab 34
- In accordance with EN61000-4-6



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SECTION 5

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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