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Report On

FCC Testing of the Sharp SHL24 Dual-band CDMA (BC0, BC6), Quad-band GSM (GSM850/GSM900/DCS1800/PCS1900), Dual-band UMTS (FDDI, FDDV), Quad-band LTE (B1, B3, B11, B18), Multi mode cellular phone with Bluetooth, WLAN, SRD(NFC,FeliCa) and GPS
In accordance with FCC CFR 47 Part 15B

COMMERCIAL-IN-CONFIDENCE

FCC ID: APYHRO00201

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February 2014



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COMMERCIAL-IN-CONFIDENCE

REPORT ON

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Sharp SHL24 Dual-band CDMA (BC0, BC6), Quad-band GSM (GSM850/GSM900/DCS1800/PCS1900), Dual-band UMTS (FDDI, FDDV), Quad-band LTE (B1, B3, B11, B18), Multi mode cellular phone with Bluetooth, WLAN, SRD(NFC, FeliCa) and GPS
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DATED

03 February 2014

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

Test Engineer(s);

N Rousell

Document 75924750 Report 17 Issue 1

G Lawler



T Guy



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SECTION 1

REPORT SUMMARY

FCC Testing of the
Sharp SHL24 Dual-band CDMA (BC0, BC6), Quad-band GSM
(GSM850/GSM900/DCS1800/PCS1900), Dual-band UMTS (FDDI, FDDV), Quad-band LTE
(B1, B3, B11, B18), Multi mode cellular phone with Bluetooth, WLAN, SRD(NFC, FeliCa) and
GPS
In accordance with FCC CFR 47 Part 15B



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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 SHL24 Dual-band CDMA (BC0, BC6), Quad-band GSM (GSM850/GSM900/DCS1800/PCS1900), Dual-band UMTS (FDDI, FDDV), Quad-band LTE (B1, B3, B11, B18), Multi mode cellular phone with Bluetooth, WLAN, SRD(NFC, FeliCa) and GPS to the requirements of FCC CFR 47 Part 15B.

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)	SHL24
Serial Number(s)	IMEI 004401115003754
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 15B (2012)
Disposal	Held Pending Disposal
Reference Number	Not Applicable
Date	Not Applicable
Order Number	9952
Date	25 November 2013
Start of Test	5 January 2014
Finish of Test	12 January 2014
Name of Engineer(s)	N Rousell G Lawler T Guy



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1.2 BRIEF SUMMARY OF RESULTS

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

Section	Spec Clause	Test Description	Result	Comments/Base Standard
AC Powered/USB with GPS Rx Operational				
2.1	15.107	AC Line Conducted Emissions	Pass	
2.2	15.109	Radiated Emissions	Pass	



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1.3 PRODUCT TECHNICAL DESCRIPTION

Please refer to the SHL24 Model Description Form.

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Sharp SHL24 Dual-band CDMA (BC0, BC6), Quad-band GSM (GSM850/GSM900/DCS1800/PCS1900), Dual-band UMTS (FDDI, FDDV), Quad-band LTE (B1, B3, B11, B18), Multi mode cellular phone with Bluetooth, WLAN, SRD(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 an integral battery.

FCC Measurement Facility Registration Number
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 SHL24 Dual-band CDMA (BC0, BC6), Quad-band GSM
(GSM850/GSM900/DCS1800/PCS1900), Dual-band UMTS (FDDI, FDDV), Quad-band LTE
(B1, B3, B11, B18), Multi mode cellular phone with Bluetooth, WLAN, SRD(NFC, FeliCa) and
GPS
In accordance with FCC CFR 47 Part 15B



2.1 AC LINE CONDUCTED EMISSIONS

2.1.1 Specification Reference

FCC CFR 47 Part 15B, Clause 15.107

2.1.2 Equipment Under Test and Modification State

SHL24 S/N: IMEI 004401115003754 - Modification State 0

2.1.3 Date of Test

12 January 2014

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 set up on a test table 800mm above a horizontal ground plane. A vertical ground plane is also required and is placed 400mm from the EUT.

The EUT was powered through a Line Impedance Stabilisation Network (LISN) which was bonded to the ground plane. The EUT is located so that the distance between the EUT and the LISN was no less than 800mm. Where possible the cable between the mains input of the EUT and the LISN is 1m. Where this was not possible the cable is non inductively bundled with the bundle not exceeding 400mm in length.

A preliminary profile of the Conducted Emissions is obtained over the frequency range 150kHz to 30MHz. Any points of interest were noted for formal measurements.

During formal measurements, the measuring receiver was tuned to the emission of interest where Quasi – Peak and Average measurements are performed in a 9kHz Video and Resolution Bandwidth.

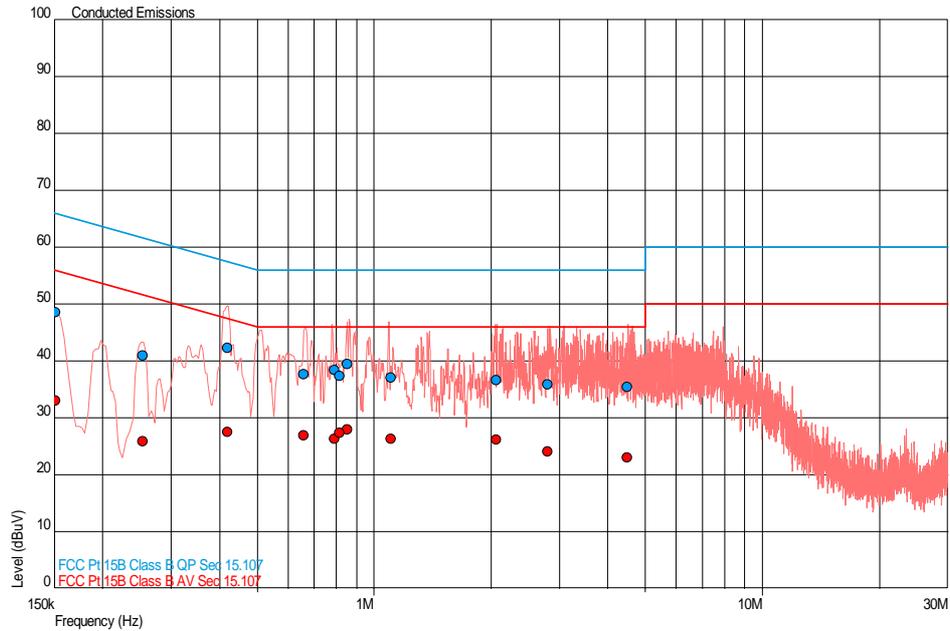
2.1.6 Environmental Conditions

Ambient Temperature	22.6°C
Relative Humidity	24.0%



2.1.7 Test Results

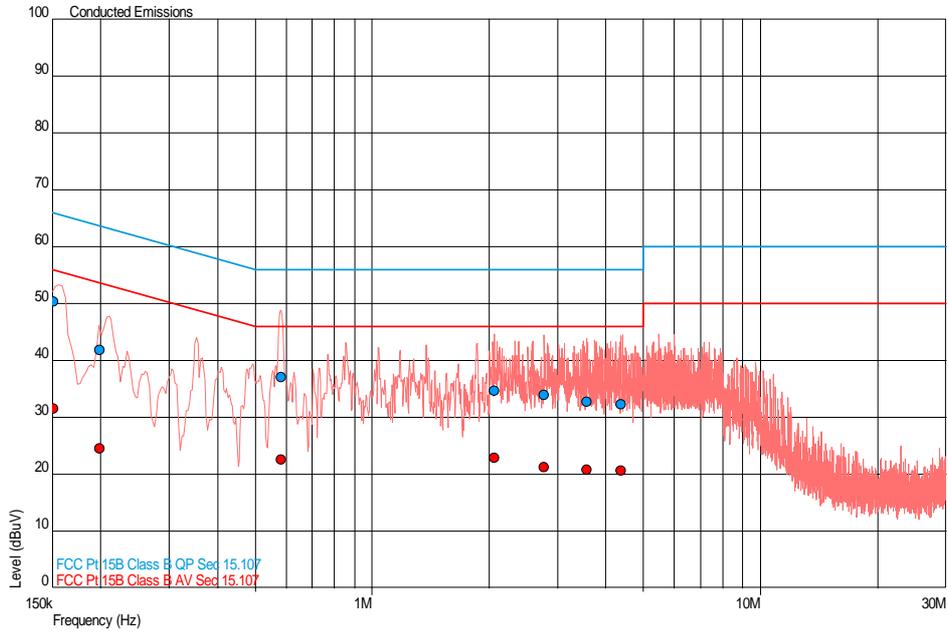
Live Line



Frequency (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dBµV)	AV Level (dBµV)	AV Limit (dBµV)	AV Margin (dBµV)
0.151	48.6	66.0	-17.4	33.1	56.0	-22.9
0.254	41.0	61.6	-20.6	25.9	51.6	-25.7
0.420	42.4	57.4	-15.1	27.5	47.4	-20.0
0.660	37.7	56.0	-18.3	26.9	46.0	-19.1
0.790	38.5	56.0	-17.5	26.4	46.0	-19.6
0.813	37.4	56.0	-18.6	27.4	46.0	-18.6
0.853	39.5	56.0	-16.5	28.0	46.0	-18.0
1.106	37.2	56.0	-18.8	26.3	46.0	-19.7
2.058	36.6	56.0	-19.4	26.1	46.0	-19.9
2.795	35.9	56.0	-20.1	24.1	46.0	-21.9
4.492	35.5	56.0	-20.5	23.1	46.0	-22.9



Neutral Line



Frequency (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dBµV)	AV Level (dBµV)	AV Limit (dBµV)	AV Margin (dBµV)
0.152	50.4	65.9	-15.5	31.6	55.9	-24.3
0.199	41.9	63.7	-21.8	24.6	53.7	-29.1
0.584	37.0	56.0	-19.0	22.6	46.0	-23.4
2.060	34.7	56.0	-21.3	22.9	46.0	-23.1
2.774	34.0	56.0	-22.0	21.3	46.0	-24.7
3.561	32.8	56.0	-23.2	20.8	46.0	-25.2
4.373	32.2	56.0	-23.8	20.7	46.0	-25.3



2.2 RADIATED EMISSIONS

2.2.1 Specification Reference

FCC CFR 47 Part 15B, Clause 15.109

2.2.2 Equipment Under Test and Modification State

SHL24 S/N: IMEI 004401115003754 - Modification State 0

2.2.3 Date of Test

5 January 2014, 9 January 2014 & 11 January 2014

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

A preliminary profile of the Spurious Radiated Emissions was obtained up to the 5th harmonic of the EUT's highest internally generated fundamental frequency. For frequencies from 30MHz to 18GHz the EUT is placed on a test table 800mm above the ground plane. For frequencies above 18GHz, the EUT height is increased by 200mm to a height of 1000mm. This is to ensure the beam width of the measuring antenna gives sufficient vertical coverage of the EUT.

During characterisation the turntable azimuth was adjusted from 0 to 360 degrees with the measuring antenna in one polarity. It was then repeated for the other polarity. Any frequencies of interest were noted for formal measuring later. The distance from the measuring antenna to the boundary of the EUT was 3m. Above 18GHz this distance was reduced to 1m.

During formal measurement the spectrum analyser was tuned to the frequency of the emission. The turntable azimuth was adjusted from 0 to 360 degrees to determine the point at which the maximum emission level occurred. Then the height of the measuring antenna was adjusted from a height of 1m to 4m to determine the height at which the maximum emission level occurred. Once the point of maximum emission has been determined the emission was measured. Emissions in the 30MHz to 1GHz range were measured using a CISPR Quasi – Peak detector function in a 120kHz bandwidth. Emissions in the range 1GHz to 40GHz require Peak and Average measurements. The Peak measurements are made using a peak detector with 1MHz Resolution and Video bandwidths. The average measurements employ a peak detector with a Resolution bandwidth of 1MHz and a Video bandwidth of 10Hz. If measurements were made at a 1m measuring distance, then 10dB was added to the specification limit.

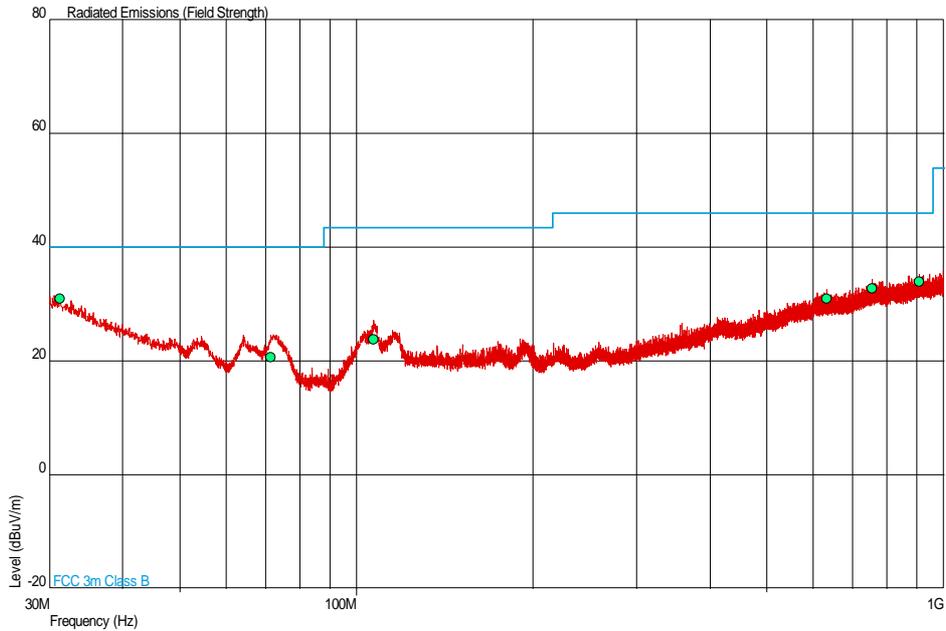
2.2.6 Environmental Conditions

Ambient Temperature	20.0 - 22.0°C
Relative Humidity	34.0 - 42.0%



2.2.7 Test Results

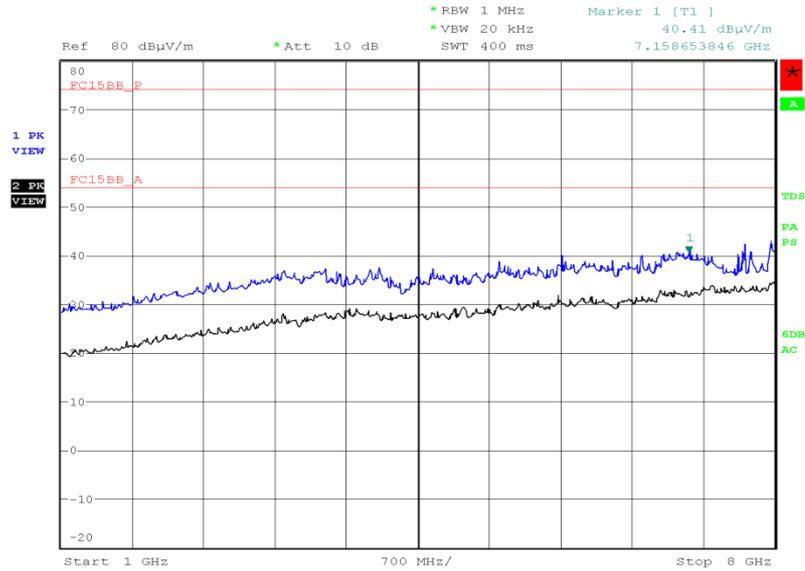
30 MHz to 1 GHz



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
31.261	31.0	35.5	40.0	100	-9.0	64.5	360	2.85	Vertical
71.420	20.7	10.8	40.0	100	-19.3	89.2	0	1.00	Vertical
106.947	23.8	15.5	43.5	150	-19.7	134.5	290	1.00	Vertical
632.959	30.9	35.1	46.0	200	-15.1	164.9	217	1.00	Vertical
755.596	32.7	43.2	46.0	200	-13.3	156.8	0	1.00	Horizontal
909.547	34.0	50.1	46.0	200	-12.0	149.9	360	1.00	Horizontal

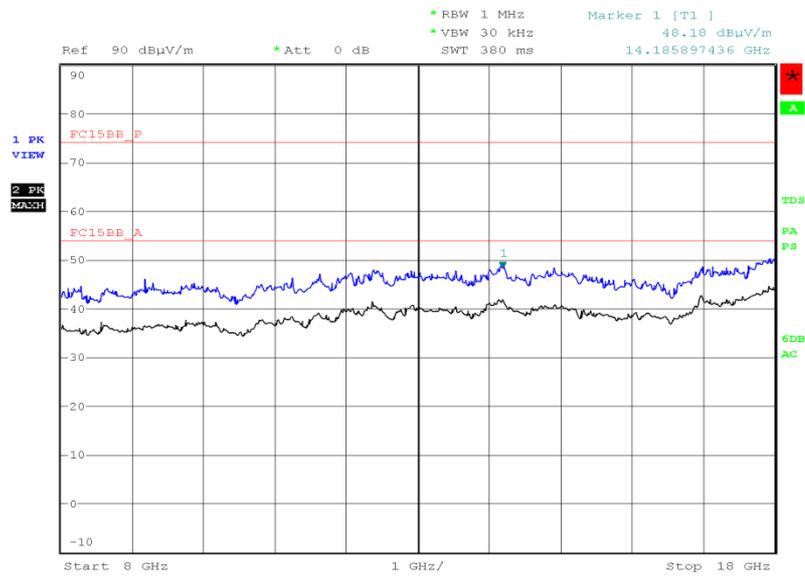


1 GHz to 8 GHz



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8 GHz to 18 GHz

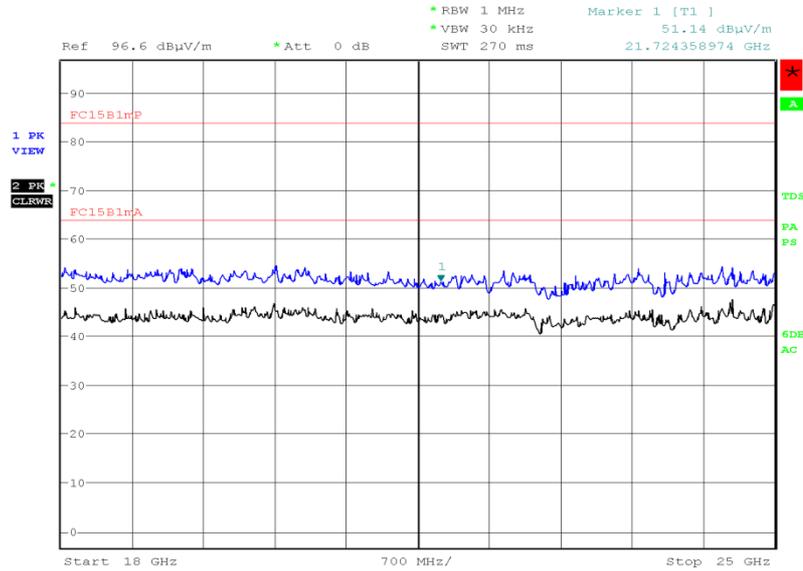


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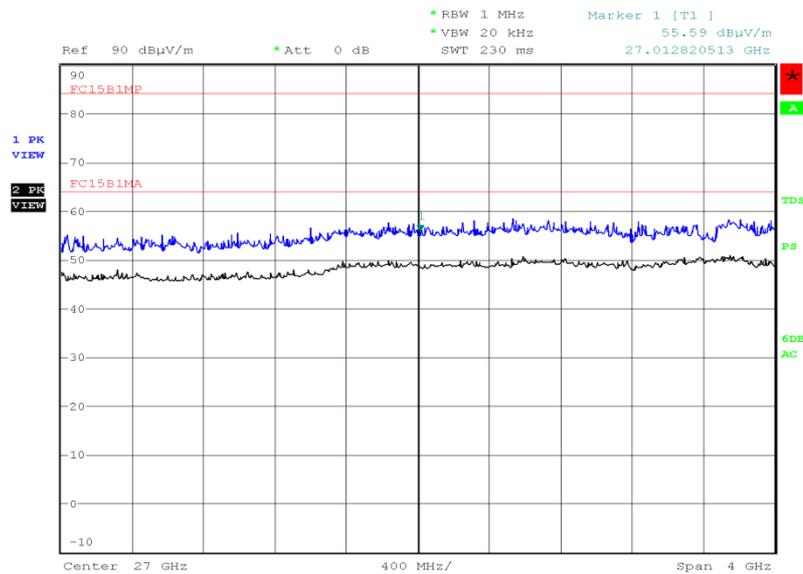
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18 GHz to 25 GHz



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25 GHz to 29 GHz



Date: 12.JAN.2014 05:36:03



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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 – AC Line Conducted Emissions					
Amplifier (18GHz-26.5GHz)	Avantek	AMT-26177-33	236	12	TU
LISN (1 Phase)	Chase	MN 2050	336	12	28-Mar-2014
Screened Room (5)	Rainford	Rainford	1545	36	25-Jan-2014
Transient Limiter	Hewlett Packard	11947A	2377	12	13-Feb-2014
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	22-Oct-2014
7m Armoured RF Cable	SSI Cable Corp.	1501-13-13-7m WA(-)	3600	-	TU
Section 2.2 - Radiated Emissions					
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	3-Apr-2014
Antenna (Bilog)	Schaffner	CBL6143	287	24	18-Jan-2014
Dual Power Supply Unit	Thurlby	PL320	288	-	TU
Pre-Amplifier	Phase One	PS04-0086	1533	12	19-Dec-2014
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	22-Oct-2014
Tilt Antenna Mast	maturo GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	maturo GmbH	NCD	3917	-	TU
1GHz to 8GHz Low Noise Amplifier	Wright Technologies	APS04-0085	4365	12	1-Oct-2014

TU – Traceability Unscheduled



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3.2 MEASUREMENT UNCERTAINTY

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

Test Discipline	MU
Radiated Emissions	30MHz to 1GHz: ± 5.1 dB 1GHz to 40GHz: ± 6.3 dB
AC Line Conducted Emissions	± 3.2 dB



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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.

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
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