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## Report On

FCC Testing of the Sharp SHL25 Dual-band CDMA (BC0, BC6) & Quad-band GSM (GSM850/GSM900/DCS1800/PCS1900) & Dual-band UMTS (FDD I, FDD V) & Quad-band LTE (B1, B3, B17, B18) & AXGP (TDD 41) multi mode cellular phone with Bluetooth, ANT+, WLAN, SRD (NFC, FeliCa) and GPS

In accordance with FCC CFR 47 Part 15B

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FCC ID: APYHRO00206

Document 75925936 Report 19 Issue 1

May 2014



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TÜV SÜD Product Service, Octagon House, Concorde Way, Segensworth North,  
Fareham, Hampshire, United Kingdom, PO15 5RL  
Tel: +44 (0) 1489 558100. Website: [www.tuv-sud.co.uk](http://www.tuv-sud.co.uk)

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**REPORT ON**

FCC Testing of the Sharp SHL25 Dual-band CDMA (BC0, BC6) & Quad-band GSM (GSM850/GSM900/DCS1800/PCS1900) & Dual-band UMTS (FDD I, FDD V) & Quad-band LTE (B1, B3, B17, B18) & AXGP (TDD 41) multi mode cellular phone with Bluetooth, ANT+, WLAN, SRD (NFC, FeliCa) and GPS  
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**PREPARED FOR**

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

**PREPARED BY**

**Natalie Bennett**  
Senior Administrator, Technical Solutions

**APPROVED BY**

**Ryan Henley**  
Authorised Signatory

**DATED**

13 May 2014

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**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);

T Guy

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## **SECTION 1**

### **REPORT SUMMARY**

FCC Testing of the  
Sharp SHL25 Dual-band CDMA (BC0, BC6) & Quad-band GSM  
(GSM850/GSM900/DCS1800/PCS1900) & Dual-band UMTS (FDD I, FDD V) & Quad-band LTE  
(B1, B3, B17, B18) & AXGP (TDD 41) multi mode cellular phone with Bluetooth, ANT+, 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 the verification of FCC Testing of the Sharp SHL25 Dual-band CDMA (BC0, BC6) & Quad-band GSM (GSM850/GSM900/DCS1800/PCS1900) & Dual-band UMTS (FDD I, FDD V) & Quad-band LTE (B1, B3, B17, B18) & AXGP (TDD 41) multi mode cellular phone with Bluetooth, ANT+, 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)	SHL25
Serial Number(s)	IMEI 004401115170330
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 15B (2013)
Disposal	Held Pending Disposal
Reference Number	Not Applicable
Date	Not Applicable
Order Number	10070
Date	10 March 2014
Start of Test	18 April 2014
Finish of Test	19 April 2014
Name of Engineer(s)	T Guy
Related Document(s)	ANSI C63.4 (2003)



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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	ANSI C63.4 (2003)
2.2	15.109	Radiated Emissions	Pass	ANSI C63.4 (2003)



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### **1.3 PRODUCT TECHNICAL DESCRIPTION**

Please refer to the SHL25 Model Description Form.

### **1.4 PRODUCT INFORMATION**

#### **1.4.1 Technical Description**

The Equipment Under Test (EUT) was a Sharp SHL25 Dual-band CDMA (BC0, BC6) & Quad-band GSM (GSM850/GSM900/DCS1800/PCS1900) & Dual-band UMTS (FDD I, FDD V) & Quad-band LTE (B1, B3, B17, B18) & AXGP (TDD 41) multi mode cellular phone with Bluetooth, ANT+, 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 a 4.0 V DC supply.

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 SHL25 Dual-band CDMA (BC0, BC6) & Quad-band GSM  
(GSM850/GSM900/DCS1800/PCS1900) & Dual-band UMTS (FDD I, FDD V) & Quad-band LTE  
(B1, B3, B17, B18) & AXGP (TDD 41) multi mode cellular phone with Bluetooth, ANT+, WLAN,  
SRD (NFC, FeliCa) and GPS  
In accordance with FCC CFR 47 Part 15B





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## **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**

SHL25 S/N: IMEI 004401115170330 - Modification State 0

### **2.1.3 Date of Test**

19 April 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**

A test environment and testing arrangement meeting the specification of ANSI C63.4 was used during all testing. The Equipment Under Test (EUT) was set upon a non-conducting platform at an elevation of 80 cm above a horizontal reference ground plane. A vertical reference ground plane was situated 40 cm from the EUT and bonded to the horizontal reference ground plane.

The EUT was powered by a Line Impedance Stabilization Network (LISN), whereby emissions measurements of the current-carrying conductors were made through this LISN. The LISN was bonded to the horizontal reference ground plane with a separation distance greater than 80 cm from the EUT. A mains supply cable of 1 m length was used to supply mains power to the EUT from the LISN.

A preliminary emissions scan was conducted for each current-carrying conductor of the EUT, using a peak detector over a frequency range of 150 kHz to 30 MHz. At least six of the greatest peak emissions, frequency positions were selected from each preliminary emissions scan for further evaluation as final measuring points.

Final measurement points were measured using quasi-peak and average detectors. All final measurements were assessed against the Class B emission limits in Clause 15.107 of FCC CFR 47 FCC Part 15.

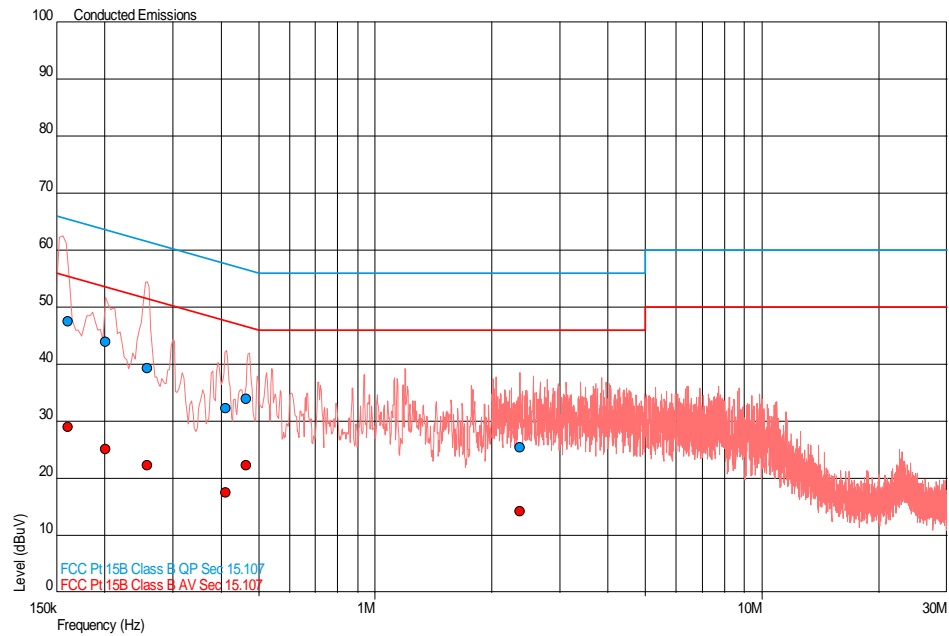
### **2.1.6 Environmental Conditions**

Ambient Temperature	19.7°C
Relative Humidity	27.0%



## 2.1.7 Test Results

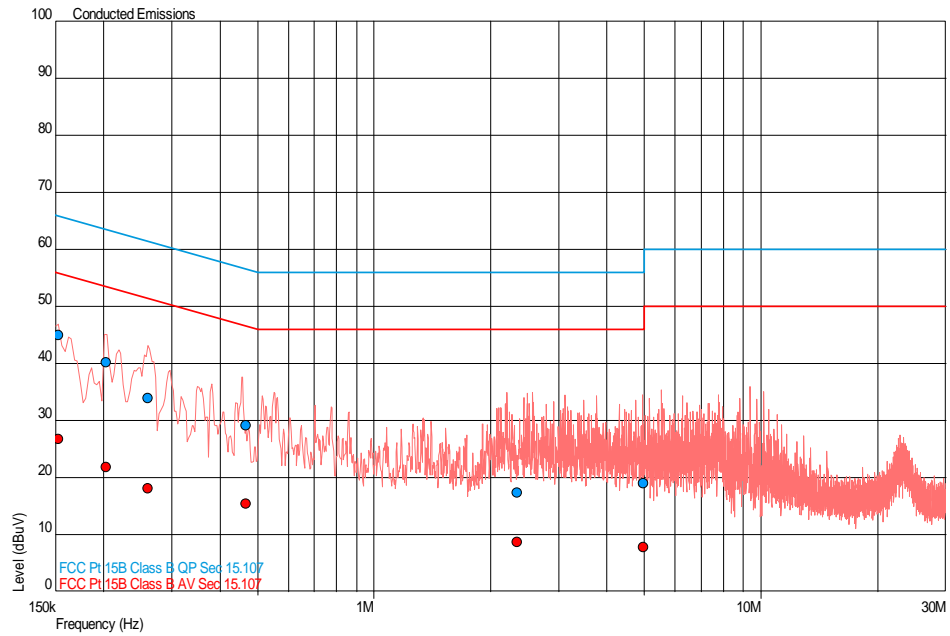
### Live Line



Frequency (MHz)	QP Level (dBμV)	QP Limit (dBμV)	QP Margin (dBμV)	AV Level (dBμV)	AV Limit (dBμV)	AV Margin (dBμV)
0.160	47.6	65.4	-17.8	29.1	55.4	-26.4
0.201	44.0	63.6	-19.6	25.2	53.6	-28.4
0.257	39.4	61.5	-22.2	22.4	51.5	-29.1
0.412	32.4	57.6	-25.2	17.5	47.6	-30.1
0.463	34.0	56.6	-22.6	22.4	46.6	-24.3
2.365	25.4	56.0	-30.6	14.3	46.0	-31.7



### Neutral Line



Frequency (MHz)	QP Level (dBμV)	QP Limit (dBμV)	QP Margin (dBμV)	AV Level (dBμV)	AV Limit (dBμV)	AV Margin (dBμV)
0.153	44.9	65.8	-20.9	26.8	55.8	-29.0
0.203	40.2	63.5	-23.3	21.9	53.5	-31.6
0.260	33.9	61.4	-27.5	18.1	51.4	-33.3
0.465	29.2	56.6	-27.4	15.4	46.6	-31.2
2.339	17.4	56.0	-38.6	8.8	46.0	-37.2
4.976	19.0	56.0	-37.0	7.8	46.0	-38.2



## **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**

SHL25 S/N: IMEI 004401115170330 - Modification State 0

### **2.2.3 Date of Test**

18 April 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 test environment and testing arrangement meeting the specification of ANSI C63.4 was used during all testing. The Equipment Under Test (EUT) was set upon a non-conducting platform at an elevation of 80 cm above a horizontal reference ground plane. The EUT was set upon a non-conducting platform during testing. When frequencies less than 18 GHz were measured; the EUT elevation was 80 cm above the horizontal reference ground plane. When frequencies greater than 18 GHz were measured; the EUT elevation was 1 m above the horizontal reference ground plane to ensure adequate vertical beam width coverage of the measuring antenna with respect to the EUT.

The horizontal reference ground plane encompasses a turntable which is used to adjust the azimuth of the EUT. An antenna positioner is used to elevate the measuring antenna above the horizontal reference ground plane whereby the antenna elevation is adjustable between 1 m and 4 m.

Exploratory radiated emissions measurements were made by azimuth emissions searches over a range of 0° and 360°. These exploratory radiated emissions measurements were made using a peak detector over a frequency range of 30 MHz to 29 GHz, with the measuring antenna in both vertical and horizontal polarizations.

At least six of the greatest peak emissions, frequency positions were selected from the exploratory radiated emissions measurements for further evaluation as final measuring points.

To ascertain the azimuth and measuring antenna polarization that yields the highest peak emission level, each final measurement frequency was investigated by continuous azimuth emissions searching with the measuring antenna in both vertical and horizontal polarizations. For each final measurement frequency, the respective peak emission azimuth and measuring antenna polarization was used during a measuring antenna elevation search from 1 m to 4 m. Each final measurement frequency was then measured with the EUT azimuth, measuring antenna height and polarization that yielded the greatest peak emission level.



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Final measurement points over the frequency range of 30 MHz to 1 GHz were measured using a quasi-peak detector. Final measurement points over the frequency range of 1 GHz and 29 GHz were measured using peak and average methods. Peak measurements were made using a peak detector with 1 MHz resolution and video bandwidths. Average measurements were made using a resolution bandwidth of 1 MHz and a video bandwidth of 30 kHz or below.

All final measurements were assessed against the Class B emission limits in Clause 15.109 of FCC CFR 47 FCC Part 15.

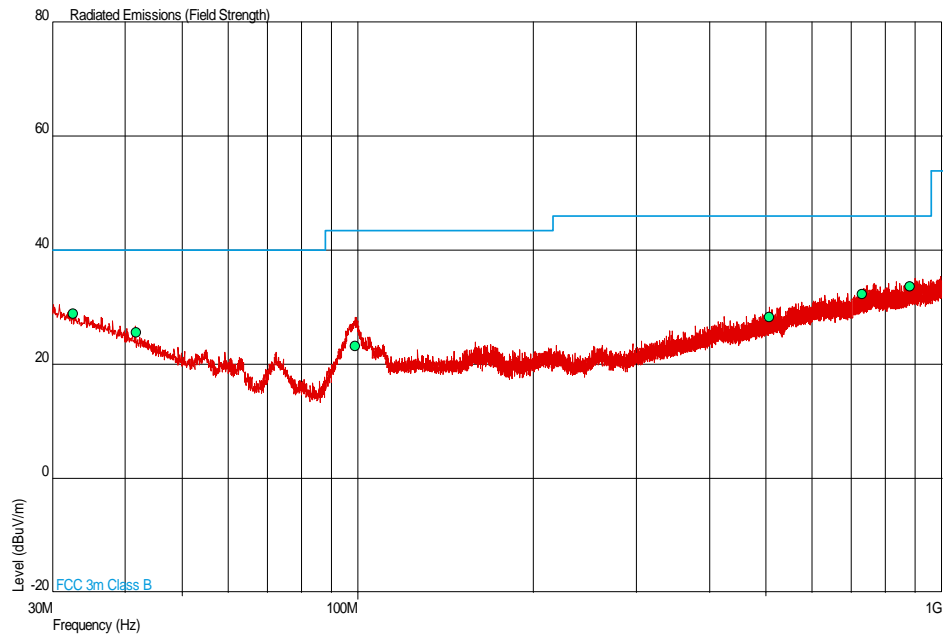
#### **2.2.6 Environmental Conditions**

Ambient Temperature	20.6°C
Relative Humidity	32.8%



## 2.2.7 Test Results

### 30 MHz to 1 GHz

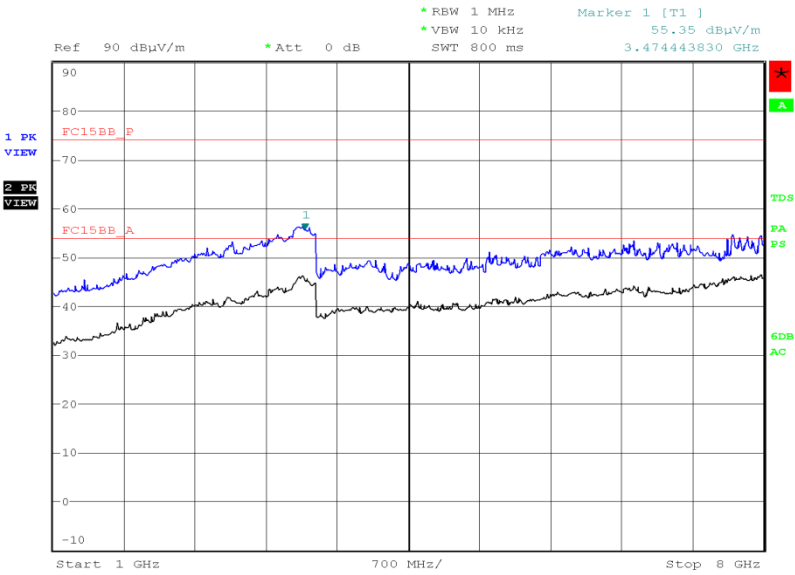


Frequency (MHz)	QP Level (dBμV/m)	QP Level (μV/m)	QP Limit (dBμV/m)	QP Limit (μV/m)	QP Margin (dBμV/m)	QP Margin (μV/m)	Angle (Deg)	Height (m)	Polarity
32.526	28.9	27.9	40.0	100	-11.1	-72.1	327	1.00	Vertical
41.698	25.6	19.1	40.0	100	-14.4	-80.9	89	1.00	Horizontal
98.914	23.2	14.5	43.5	150	-20.3	-135.5	247	1.00	Vertical
506.818	28.3	26.0	46.0	200	-17.7	-174.0	99	1.00	Horizontal
730.241	32.3	41.2	46.0	200	-13.7	-158.8	270	3.45	Vertical
883.083	33.7	48.4	46.0	200	-12.3	-151.6	250	1.00	Horizontal



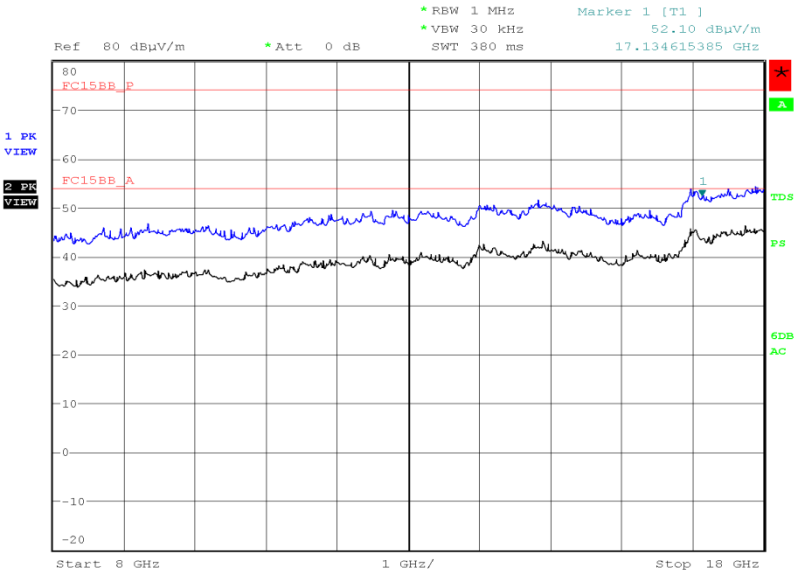
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1 GHz to 8 GHz



Date: 18.APR.2014 03:54:59

8 GHz to 18 GHz

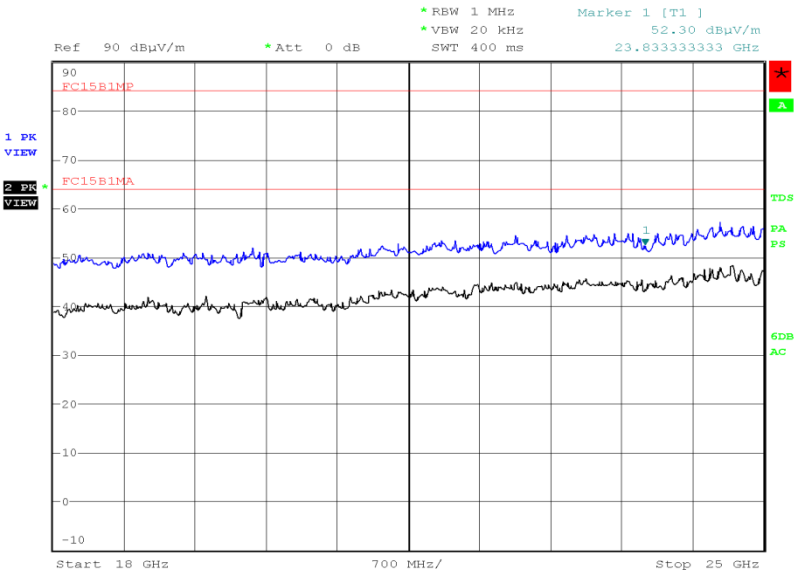


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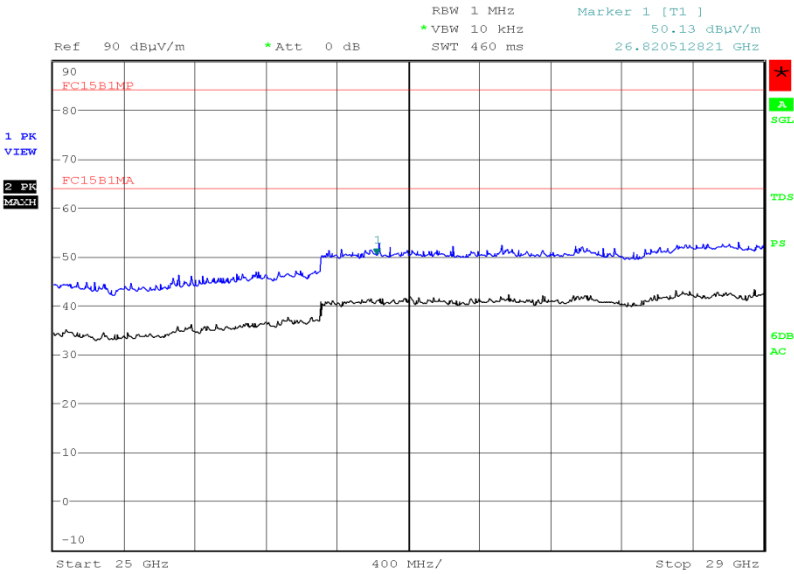
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18 GHz to 25 GHz



Date: 18.APR.2014 04:51:58

25 GHz to 29 GHz



Date: 18.APR.2014 05:06:28





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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
<b>Section 2.1 – AC Line Conducted Emissions</b>					
Transient Limiter	Hewlett Packard	11947A	15	12	10-Dec-2014
LISN (1 Phase)	Chase	MN 2050	336	12	28-Mar-2015
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	22-Oct-2014
<b>Section 2.2 - Radiated Emissions</b>					
Antenna (Double Ridge Guide)	Link Microtek Ltd	AM180HA-K-TU2	230	24	26-Nov-2015
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	3-May-2014
Dual Power Supply Unit	Thurlby	PL320	288	-	TU
Pre-Amplifier	Phase One	PS04-0086	1533	12	19-Dec-2014
Pre-Amplifier	Phase One	PSO4-0087	1534	12	30-Sep-2014
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	10-Jun-2015
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	22-Oct-2014
Tilt Antenna Mast	mature GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	mature 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: $\pm 5.1$ dB 1GHz to 40GHz: $\pm 6.3$ dB
AC Line Conducted Emissions	$\pm 3.2$ dB



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## **SECTION 4**

### **ACCREDITATION, DISCLAIMERS AND COPYRIGHT**



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#### 4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



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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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