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# Report On

FCC Testing of the  
Sharp SHF32 Quad-band GSM (850/900/1800/1900) & Dual-band  
UMTS (FDDI, FDDV) & Dual-band LTE (B1, B26) multi mode cellular  
phone with Bluetooth, WLAN, SRD(FeliCa) and GPS  
In accordance with FCC 47 CFR Part 15B

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FCC ID: APYHRO00224

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June 2015



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**DATED**

19 June 2015

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

Test Engineer(s);

G Lawler





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## **SECTION 1**

### **REPORT SUMMARY**

FCC Testing of the  
Sharp SHF32 Quad-band GSM (850/900/1800/1900) & Dual-band UMTS (FDDI, FDDV) &  
Dual-band LTE (B1, B26) multi mode cellular phone with Bluetooth, WLAN, SRD(FeliCa) and  
GPS  
In accordance with FCC 47 CFR 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 SHF32 Quad-band GSM (850/900/1800/1900) & Dual-band UMTS (FDDI, FDDV) & Dual-band LTE (B1, B26) multi mode cellular phone with Bluetooth, WLAN, SRD(FeliCa) and GPS to the requirements of FCC 47 CFR 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)               | SHF32                                                                                                                                               |
| Serial Number(s)              | IMEI 004401115362564                                                                                                                                |
| Number of Samples Tested      | 1                                                                                                                                                   |
| Test Specification/Issue/Date | FCC 47 CFR Part 15B (2014)                                                                                                                          |
| Disposal                      | Held Pending Disposal                                                                                                                               |
| Reference Number              | Not Applicable                                                                                                                                      |
| Date                          | Not Applicable                                                                                                                                      |
| Order Number                  | 10534                                                                                                                                               |
| Date                          | 17 April 2015                                                                                                                                       |
| Start of Test                 | 26 May 2015                                                                                                                                         |
| Finish of Test                | 9 June 2015                                                                                                                                         |
| Name of Engineer(s)           | G Lawler                                                                                                                                            |
| Related Document(s)           | ANSI C63.4 (2009)                                                                                                                                   |



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## 1.2 BRIEF SUMMARY OF RESULTS

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

| Section                                | Specification 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 SHF32 Model Description Form.

### **1.4 PRODUCT INFORMATION**

#### **1.4.1 Technical Description**

The Equipment Under Test (EUT) was a Sharp SHF32 Quad-band GSM (850/900/1800/1900) & Dual-band UMTS (FDDI, FDDV) & Dual-band LTE (B1, B26) multi mode cellular phone with Bluetooth, WLAN, SRD(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 SHF32 Quad-band GSM (850/900/1800/1900) & Dual-band UMTS (FDDI, FDDV) &  
Dual-band LTE (B1, B26) multi mode cellular phone with Bluetooth, WLAN, SRD(FeliCa) and  
GPS  
In accordance with FCC 47 CFR Part 15B



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**2.1 AC LINE CONDUCTED EMISSIONS****2.1.1 Specification Reference**

FCC 47 CFR Part 15B, Clause 15.107

**2.1.2 Equipment Under Test and Modification State**

SHF32 S/N: IMEI 004401115362564 - Modification State 0

**2.1.3 Date of Test**

9 June 2015

**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 test was performed in accordance with ANSI C63.4, Clause 7.

**Remarks**

A mains supply cable of 1 m length was used to supply mains power to the EUT from the LISN.

All final measurements were assessed against the Class B emission limits in FCC 47 CFR Part 15, Clause 15.107.

**2.1.6 Environmental Conditions**

|                     |        |
|---------------------|--------|
| Ambient Temperature | 20.6°C |
| Relative Humidity   | 32.0%  |

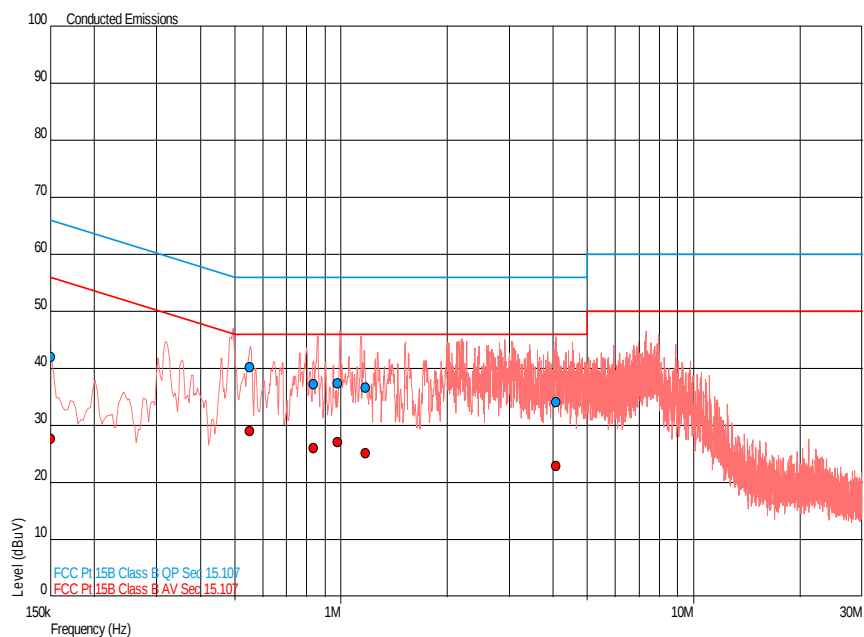


## 2.1.7 Test Results

### AC Powered/USB with GPS Rx Operational, Live Line Results

| Frequency (MHz) | QP Level (dBμV) | QP Limit (dBμV) | QP Margin (dBμV) | AV Level (dBμV) | AV Limit (dBμV) | AV Margin (dBμV) |
|-----------------|-----------------|-----------------|------------------|-----------------|-----------------|------------------|
| 0.150           | 42.1            | 66.0            | -23.9            | 27.7            | 56.0            | -28.3            |
| 0.551           | 40.3            | 56.0            | -15.7            | 29.0            | 46.0            | -17.0            |
| 0.836           | 37.3            | 56.0            | -18.7            | 26.1            | 46.0            | -19.9            |
| 0.976           | 37.4            | 56.0            | -18.6            | 27.1            | 46.0            | -18.9            |
| 1.172           | 36.7            | 56.0            | -19.3            | 25.1            | 46.0            | -20.9            |
| 4.066           | 34.1            | 56.0            | -21.9            | 22.9            | 46.0            | -23.1            |

### AC Powered/USB with GPS Rx Operational, Live Line Plot

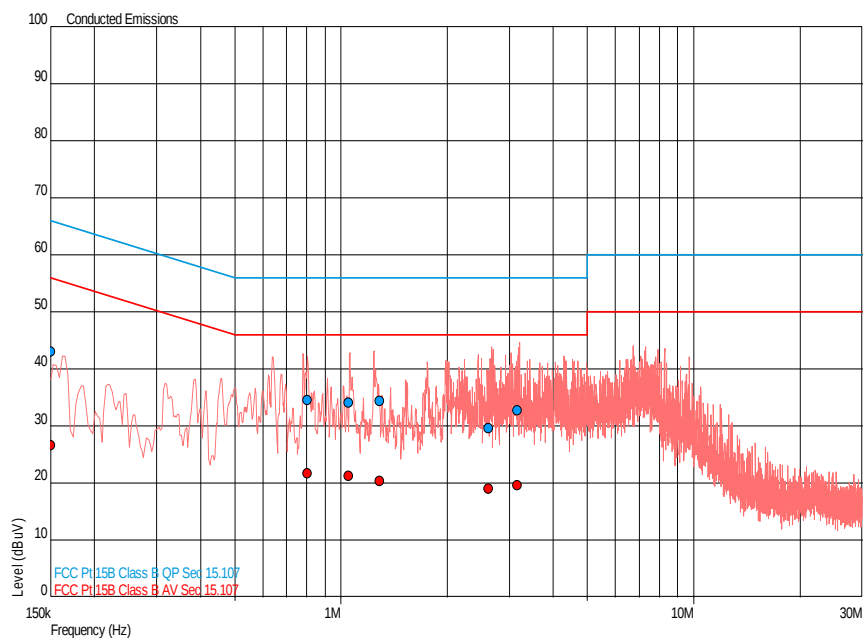




### AC Powered/USB with GPS Rx Operational, Neutral Line Results

| Frequency (MHz) | QP Level (dBμV) | QP Limit (dBμV) | QP Margin (dBμV) | AV Level (dBμV) | AV Limit (dBμV) | AV Margin (dBμV) |
|-----------------|-----------------|-----------------|------------------|-----------------|-----------------|------------------|
| 0.150           | 43.0            | 66.0            | -23.0            | 26.6            | 56.0            | -29.4            |
| 0.801           | 34.5            | 56.0            | -21.5            | 21.7            | 46.0            | -24.3            |
| 1.051           | 34.1            | 56.0            | -21.9            | 21.3            | 46.0            | -24.7            |
| 1.284           | 34.3            | 56.0            | -21.7            | 20.4            | 46.0            | -25.6            |
| 2.622           | 29.7            | 56.0            | -26.3            | 19.0            | 46.0            | -27.0            |
| 3.163           | 32.7            | 56.0            | -23.3            | 19.6            | 46.0            | -26.4            |

### AC Powered/USB with GPS Rx Operational, Neutral Line Plot



### FCC 47 CFR Part 15, Limit Clause 15.107

#### Class B

| Frequency of Emission (MHz) | Conducted Limit (dBμV) |           |
|-----------------------------|------------------------|-----------|
|                             | Quasi-Peak             | Average   |
| 0.15 to 0.5                 | 66 to 56*              | 56 to 46* |
| 0.5 to 5                    | 56                     | 46        |
| 5 to 30                     | 60                     | 50        |

\*Decreases with the logarithm of the frequency.



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**2.2 RADIATED EMISSIONS****2.2.1 Specification Reference**

FCC 47 CFR Part 15B, Clause 15.109

**2.2.2 Equipment Under Test and Modification State**

SHF32 S/N: IMEI 004401115362564 - Modification State 0

**2.2.3 Date of Test**

26 May 2015

**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 performed in accordance with ANSI C63.4, Clause 8.

Remarks

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

**2.2.6 Environmental Conditions**

|                     |        |
|---------------------|--------|
| Ambient Temperature | 21.0°C |
| Relative Humidity   | 37.0%  |

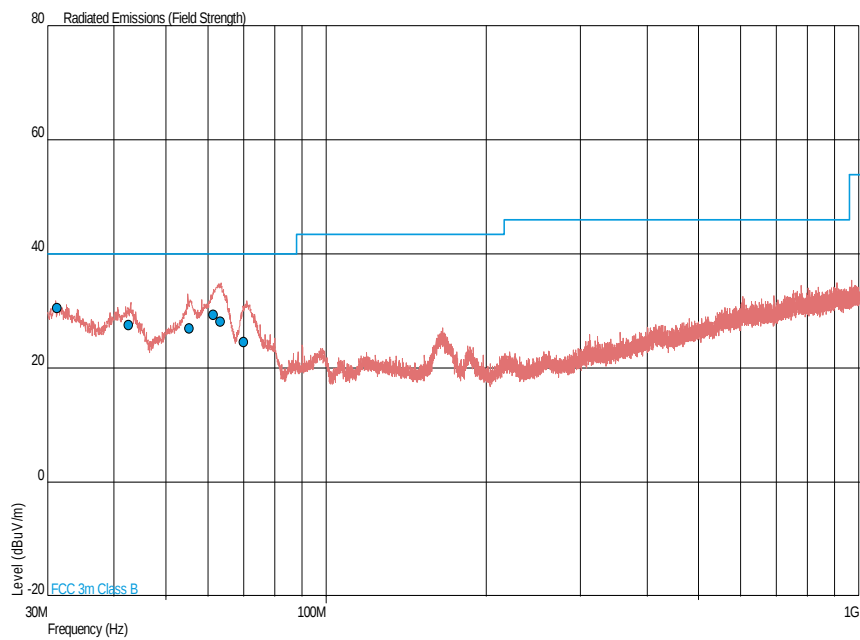


## 2.2.7 Test Results

### AC Powered/USB with GPS Rx Operational, 30 MHz to 1 GHz Results

| Frequency (MHz) | Quasi-Peak Level (dB $\mu$ V/m) | Quasi-Peak Level ( $\mu$ V/m) | Quasi-Peak Margin (dB $\mu$ V/m) | Quasi-Peak Margin ( $\mu$ V/m) | Angle (°) | Height (m) | Polarisation |
|-----------------|---------------------------------|-------------------------------|----------------------------------|--------------------------------|-----------|------------|--------------|
| 31.269          | 30.6                            | 33.9                          | -9.4                             | -66.1                          | 354       | 1.00       | Vertical     |
| 42.613          | 27.5                            | 23.7                          | -12.5                            | -76.3                          | 150       | 1.00       | Vertical     |
| 55.408          | 26.9                            | 22.1                          | -13.1                            | -77.9                          | 26        | 1.00       | Vertical     |
| 61.362          | 29.3                            | 29.2                          | -10.7                            | -70.8                          | 360       | 1.04       | Vertical     |
| 63.359          | 28.2                            | 25.7                          | -11.8                            | -74.3                          | 341       | 1.00       | Vertical     |
| 70.109          | 24.6                            | 17.0                          | -15.4                            | -83.0                          | 19        | 1.00       | Vertical     |

### AC Powered/USB with GPS Rx Operational, 30 MHz to 1 GHz Plot





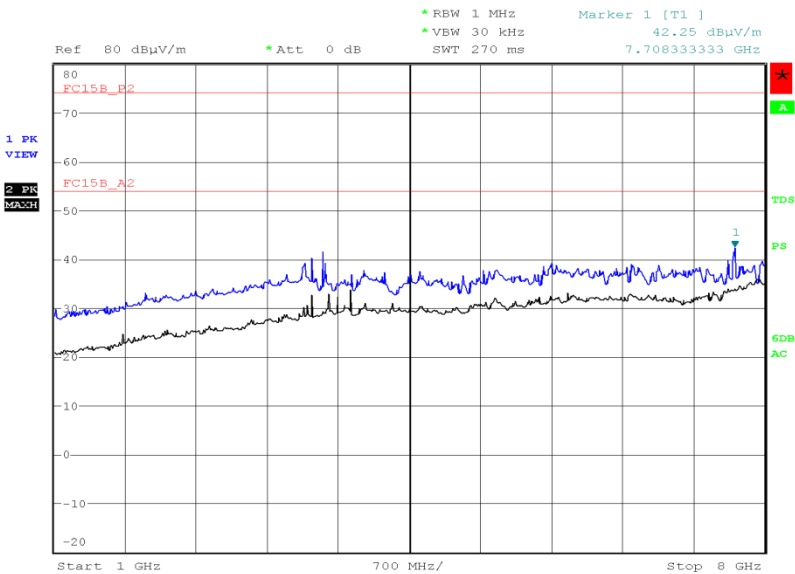
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AC Powered/USB with GPS Rx Operational, 1 GHz to 13 GHz Results

| Frequency (MHz) | Average Level (dBμV/m) | Peak Level (dBμV/m) | Average Level (μV/m) | Peak Level (μV/m) | Angle (deg) | Height (m) | Polarisation |
|-----------------|------------------------|---------------------|----------------------|-------------------|-------------|------------|--------------|
| *               |                        |                     |                      |                   |             |            |              |

\*No other emissions were detected within 10 dB of the limit.

AC Powered/USB with GPS Rx Operational, 1 GHz to 8 GHz Plot

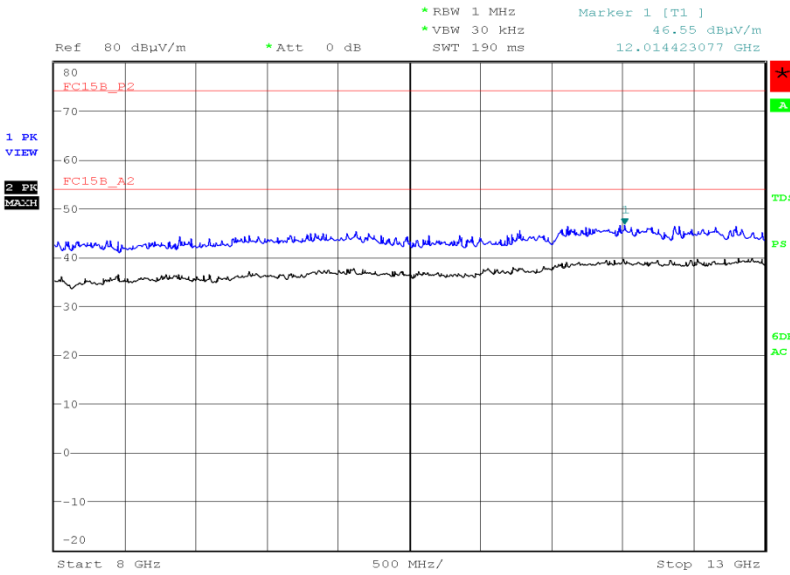


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AC Powered/USB with GPS Rx Operational, 8 GHz to 13 GHz Plot



Date: 26.MAY.2015 19:10:14

FCC 47 CFR Part 15, Limit Clause 15.109

Class B

| Frequency of Emission (MHz) | Field Strength (μV/m) |
|-----------------------------|-----------------------|
| 30 to 88                    | 100                   |
| 88 to 216                   | 150                   |
| 216 to 960                  | 200                   |
| Above 960                   | 500                   |



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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                          | 16-Dec-2015     |
| LISN (1 Phase)                                   | Chase               | MN 2050             | 336    | 12                          | 1-Apr-2016      |
| Screened Room (5)                                | Rainford            | Rainford            | 1545   | 24                          | 26-Jun-2015     |
| Multimeter                                       | Iso-tech            | IDM101              | 2418   | 12                          | 26-Sep-2015     |
| EMI Test Receiver                                | Rohde & Schwarz     | ESU40               | 3506   | 12                          | 27-Oct-2015     |
| 7m Armoured RF Cable                             | SSI Cable Corp.     | 1501-13-13-7m WA(-) | 3600   | -                           | TU              |
| Hygropalm Temperature and Humidity Meter         | Rotronic            | HP21                | 4410   | 12                          | 15-Apr-2016     |
| <b>Section 2.2 - Radiated Emissions</b>          |                     |                     |        |                             |                 |
| Antenna (Double Ridge Guide, 1GHz-18GHz)         | EMCO                | 3115                | 234    | 12                          | 29-Apr-2016     |
| Dual Power Supply Unit                           | Thurlby             | PL320               | 288    | -                           | TU              |
| Pre-Amplifier                                    | Phase One           | PS04-0086           | 1533   | 12                          | 23-Dec-2015     |
| Screened Room (5)                                | Rainford            | Rainford            | 1545   | 24                          | 26-Jun-2015     |
| Turntable Controller                             | Inn-Co GmbH         | CO 1000             | 1606   | -                           | TU              |
| Multimeter                                       | Iso-tech            | IDM101              | 2418   | 12                          | 26-Sep-2015     |
| Antenna (Bilog)                                  | Chase               | CBL6143             | 2904   | 24                          | 10-Jun-2015     |
| EMI Test Receiver                                | Rohde & Schwarz     | ESU40               | 3506   | 12                          | 27-Oct-2015     |
| 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              |
| 1GHz to 8GHz Low Noise Amplifier                 | Wright Technologies | APS04-0085          | 4365   | 12                          | 1-Oct-2015      |
| Hygropalm Temperature and Humidity Meter         | Rotronic            | HP21                | 4410   | 12                          | 15-Apr-2016     |
| 2m K-Type Cable (Rx)                             | Scott Cables        | KPS-1501-2000-KPS   | 4527   | 6                           | 29-Jul-2015     |
| 0.5m SMA Cable (Rx)                              | Scott Cables        | SLSLL18-SMSM-00.50M | 4528   | 6                           | 29-Jul-2015     |

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                                                             |
|-----------------------------|----------------------------------------------------------------|
| AC Line Conducted Emissions | $\pm 3.2$ dB                                                   |
| Radiated Emissions          | 30 MHz to 1 GHz: $\pm 5.1$ dB<br>1 GHz to 40 GHz: $\pm 6.3$ dB |



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## **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  
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