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Report On

FCC Testing of the Sharp SHV32 Hex-band LTE (B1 / B3 / B5 / B17 / B26 / B28), Dual-band WCDMA (FDD I / V), Quad-band GSM (850/900/1800/1900) & AXGP (TDD41) multi mode Smart phone with Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS
In accordance with FCC 47 CFR Part 15C (FeliCa)

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FCC ID: APYHRO00218

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May 2015



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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

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REPORT ON

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PREPARED FOR

Sharp Communication Compliance Ltd
Inspired
Easthampstead Road
Bracknell
Berkshire
RG12 1NS

PREPARED BY

Natalie Bennett
Senior Administrator, Project Support

APPROVED BY

Nic Forsyth
Authorised Signatory

DATED

14 May 2015

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

Test Engineer(s);

M Toubella

T Guy

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SECTION 1

REPORT SUMMARY

FCC Testing of the
Sharp SHV32 Hex-band LTE (B1 / B3 / B5 / B17 / B26 / B28), Dual-band WCDMA (FDD I / V),
Quad-band GSM (850/900/1800/1900) & AXGP (TDD41) multi mode Smart phone with
Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS
In accordance with FCC 47 CFR Part 15C (FeliCa)



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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 SHV32 Hex-band LTE (B1 / B3 / B5 / B17 / B26 / B28), Dual-band WCDMA (FDD I / V), Quad-band GSM (850/900/1800/1900) & AXGP (TDD41) multi mode Smart phone with Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS to the requirements of FCC 47 CFR Part 15C.

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)	SHV32
Serial Number(s)	IMEI 004401115406668 IMEI 004401115406684
Number of Samples Tested	2
Test Specification/Issue/Date	FCC 47 CFR Part 15C (2014)
Incoming Release Date	Application Form N/A
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	10477 02 March 2015
Start of Test	28 April 2015
Finish of Test	10 May 2015
Name of Engineer(s)	M Toubella T Guy
Related Document(s)	ANSI C63.10: 2009



1.2 BRIEF SUMMARY OF RESULTS

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

Section	Specification Clause	Test Description	Result	Comments/Base Standard
FeliCa				
2.1	15.225 and 15.215 (c)	20 dB Bandwidth	Pass	
2.2	15.225 (a)(b)(c)(d)	Field Strength of any Emission	Pass	
2.3	15.225 (e)	Frequency Tolerance Under Temperature Variations	Pass	



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1.3 PRODUCT TECHNICAL DESCRIPTION

Please refer to the SHV32 Model Description Form.

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Sharp SHV32 Hex-band LTE (B1 / B3 / B5 / B17 / B26 / B28), Dual-band WCDMA (FDD I / V), Quad-band GSM (850/900/1800/1900) & AXGP (TDD41) multi mode Smart 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 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 SHV32 Hex-band LTE (B1 / B3 / B5 / B17 / B26 / B28), Dual-band WCDMA (FDD I / V),
Quad-band GSM (850/900/1800/1900) & AXGP (TDD41) multi mode Smart phone with
Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS
In accordance with FCC 47 CFR Part 15C (FeliCa)



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2.1 20 dB BANDWIDTH**2.1.1 Specification Reference**

FCC 47 CFR Part 15C, Clause 15.225 and 15.215 (c)

2.1.2 Equipment Under Test and Modification State

SHV32 S/N: IMEI 004401115406684 - Modification State 0

2.1.3 Date of Test

28 April 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 C63.10, clause 6.9.1.

2.1.6 Environmental Conditions

Ambient Temperature	24.5°C
Relative Humidity	21.3%



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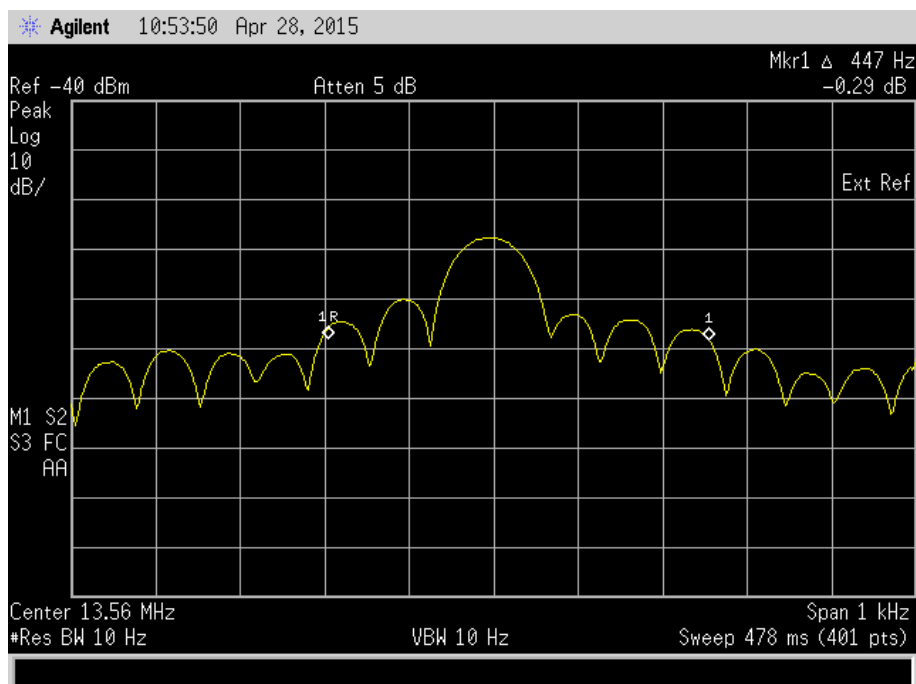
2.1.7 Test Results

4.0 V DC Supply

FeliCa, 20 dB Bandwidth Result

Frequency (MHz)	20 dB Bandwidth (Hz)
13.56	447

FeliCa, 20 dB Bandwidth Plot



FCC 47 CFR Part 15, Limit Clause 15.215 (c)

The 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.



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2.2 FIELD STRENGTH OF ANY EMISSION

2.2.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.225 (a)(b)(c)(d)

2.2.2 Equipment Under Test and Modification State

SHV32 S/N: IMEI 004401115406668 - Modification State 0

2.2.3 Date of Test

10 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 C63.10, clause 6.3, 6.4 and 6.5.

2.2.6 Environmental Conditions

Ambient Temperature	20.5°C
Relative Humidity	32.6%



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2.2.7 Test Results

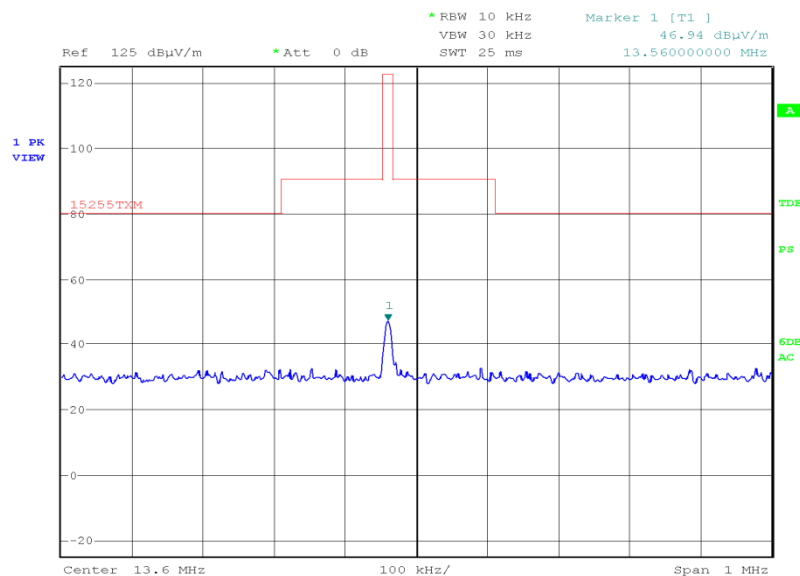
4.0 V DC Supply

FeliCa, Carrier Results

Frequency (MHz)	Quasi-Peak Level (dB μ V/m) at 3m	Quasi-Peak Level (dB μ V/m) at 30m	Quasi-Peak Level (μ V/m) at 30m	Quasi-Peak Level (μ V/m) at 3m	Angle (°)	Height (m)	Polarisation
13.56	42.08	2.08	1.28	127.06	188	1	Face On

*The level at 30m was calculated using the dB μ V/m measurement at 3m and extrapolating this result to produce a level at 30m. This value was then converted to obtain the value in μ V/m.

FeliCa, Carrier Plot



Date: 10.MAY.2015 21:37:08



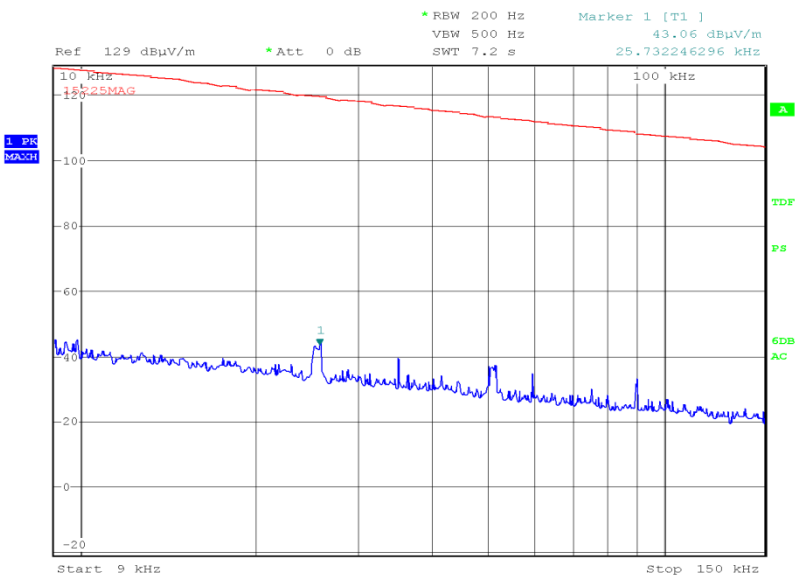
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FeliCa, Field Strength of any Emission Results

Frequency (MHz)	Quasi-Peak Level (dBµV/m) at 3m	Quasi-Peak Level (dBµV/m) at 30m	Quasi-Peak Level (µV/m) at 3m	Quasi-Peak Level (µV/m) at 30m	Angle (°)	Height (m)	Polarisation
*							

*No emissions were detected within 20 dB of the limit.

FeliCa, 9 kHz to 150 kHz, Field Strength of any Emission Plot

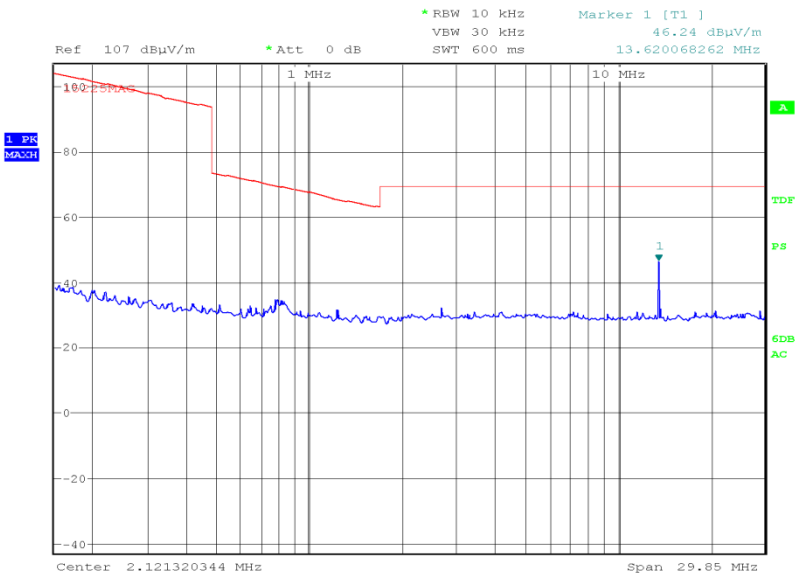


Date: 10.MAY.2015 22:16:00



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FeliCa, 150 kHz to 30 MHz, Field Strength of any Emission Plot



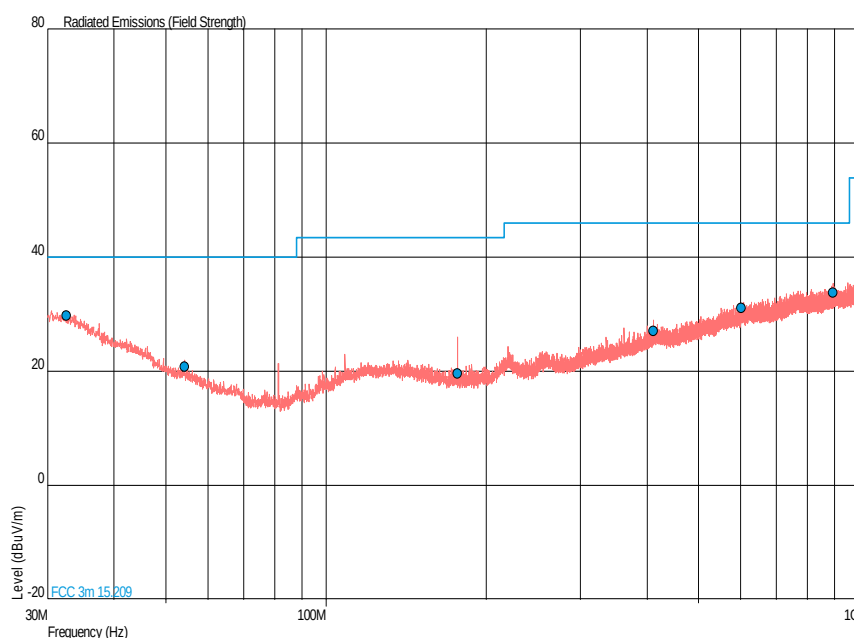
Date: 10.MAY.2015 21:55:40



FeliCa, 30 MHz to 1 GHz, Field Strength of any Emission Results

Frequency (MHz)	Quasi-Peak Level (dBμV/m)	Quasi-Peak Level (μV/m)	Quasi-Peak Margin (dBμV/m)	Quasi-Peak Margin (μV/m)	Angle (°)	Height (m)	Polarisation
32.627	29.8	-10.2	30.9	-69.1	273	1.00	Vertical
54.240	20.8	-19.2	11.0	-89.0	35	1.00	Vertical
176.166	19.6	-23.9	9.5	-140.5	313	2.11	Vertical
410.749	27.1	-18.9	22.6	-177.4	265	1.00	Horizontal
601.699	31.2	-14.8	36.3	-163.7	217	3.02	Horizontal
892.456	33.8	-12.2	49.0	-151.0	123	1.62	Horizontal

FeliCa, 30 MHz to 1 GHz, Field Strength of any Emission Plot



FCC 47 CFR Part 15, Limit Clause 15.225 (a)(b)(c)(d)

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.



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FCC 47 CFR Part 15, Limit Clause 15.209

Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
0.009 to 0.490	2400/F (kHz)	300
0.490 to 1.705	24000/F (kHz)	30
1705 to 30	30	30
30 to 88	100**	3
88 to 216	150**	3
216 to 960	200**	3
Above 960	500	5



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2.3 FREQUENCY TOLERANCE UNDER TEMPERATURE VARIATIONS

2.3.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.225 (e)

2.3.2 Equipment Under Test and Modification State

SHV32 S/N: IMEI 004401115406684 - Modification State 0

2.3.3 Date of Test

30 April 2015

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 test was performed in accordance with ANSI C63.10, clause 6.8.

2.3.6 Environmental Conditions

Ambient Temperature	23.5°C
Relative Humidity	27.8%



2.3.7 Test Results

FeliCa, FeliCa, Frequency Tolerance Under Temperature Variations Results

Temperature Interval	Voltage	Fundamental Frequency (MHz)	Fundamental Frequency Deviation (%)
-20 °C	4.0 V DC	13.56	-0.0004
-10 °C	4.0 V DC	13.56	-0.0005
0 °C	4.0 V DC	13.56	0.0008
+10 °C	4.0 V DC	13.56	0.0009
+20 °C	3.7 V DC	13.56	0.0009
+20 °C	4.0 V DC	13.56	0.0009
+20 °C	4.0 V DC	13.56	0.0009
+30 °C	4.0 V DC	13.56	0.0007
+40 °C	4.0 V DC	13.56	0.0001
+50 °C	4.0 V DC	13.56	0.0001

FCC 47 CFR Part 15, Limit Clause 15.225 (e)

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 - 20dB Bandwidth					
Power Supply Unit	Farnell	TSV-70	2043	-	O/P Mon
Multimeter	Iso-tech	IDM101	2419	12	7-Oct-2015
Hygrometer	Rotronic	I-1000	3220	12	24-Jul-2015
ESA-E Series Spectrum Analyser	Agilent Technologies	E4402B	3348	12	5-Sep-2015
1 metre N-Type Cable	IW Microwave	NPS-1806LC-394-NPS	4506	12	26-Feb-2016
Section 2.2 - Field Strength of any Emission					
Dual Power Supply Unit	Thurlby	PL320	288	-	TU
Antenna (Active Loop, 9kHz-30MHz)	Rohde & Schwarz	HFH2-Z2	333	24	28-Nov-2016
Screened Room (5)	Rainford	Rainford	1545	24	26-Jun-2015
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	27-Oct-2015
Section 2.3 - Frequency Tolerance Under Temperature Variations					
Temperature Chamber	Montford	2F3	467	-	O/P Mon
Power Supply Unit	Farnell	TSV-70	2043	-	O/P Mon
Digital Thermometer	Digitron	T208	2831	12	31-Jul-2015
Radio Communications Test Set	Rohde & Schwarz	CMU 200	3035	12	6-Nov-2015
Attenuator (30dB/50W)	Aeroflex / Weinschel	47-30-34	3164	12	12-Dec-2015
Hygrometer	Rotronic	I-1000	3220	12	24-Jul-2015
ESA-E Series Spectrum Analyser	Agilent Technologies	E4402B	3348	12	5-Sep-2015
1 metre N-Type Cable	IW Microwave	NPS-1806LC-394-NPS	4506	12	26-Feb-2016
2 metre N-Type Cable	Florida Labs	NMS-235SP-78.8-NMS	4508	12	26-Feb-2016

TU – Traceability Unscheduled

O/P MON – Output Monitored with Calibrated Equipment



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3.2 MEASUREMENT UNCERTAINTY

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

Test Discipline	MU
Frequency Tolerance Under Temperature Variations	$\pm 3.54 \text{ Hz}$
Field Strength of any Emission	9 kHz to 1 GHz: $\pm 5.1 \text{ dB}$
20 dB Bandwidth	$\pm 16.74 \text{ kHz}$



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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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