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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 15C (FeliCa)

COMMERCIAL-IN-CONFIDENCE

FCC ID: APYHRO00206

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May 2014



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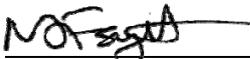
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DATED

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

Test Engineer(s);


G Lawler


M Russell




A Galpin



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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 15C (FeliCa)



Product Service

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 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)	SHL25
Serial Number(s)	IMEI 004401115170231
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 15C (2013)
Incoming Release Date	Application Form 24 March 2014
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	10070 10 March 2014
Start of Test	14 April 2014
Finish of Test	30 April 2014
Name of Engineer(s)	G Lawler M Russell A Galpin
Related Document(s)	ANSI C63.10: 2009



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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 15C is shown below.

Section	Spec Clause	Test Description	Result	Comments/Base Standard
FeliCa				
2.1	15.225 (a)(b)(c)(d)	Field Strength of any Emission	Pass	
2.2	15.225, 15.215 (c)	Occupied Bandwidth	Pass	
2.3	15.225 (e)	Frequency Stability Under Temperature Variations	Pass	



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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 15C (FeliCa)



2.1 FIELD STRENGTH OF ANY EMISSION

2.1.1 Specification Reference

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

2.1.2 Equipment Under Test and Modification State

SHL25 S/N: IMEI 004401115170231 - Modification State 0

2.1.3 Date of Test

14 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

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.

All measurements were made at a distance of 3m. The value measured in dB μ V/m at 3m was then corrected to be shown in μ V/m at 30m as shown in the table below to demonstrate compliance with the specified limit.

2.1.6 Environmental Conditions

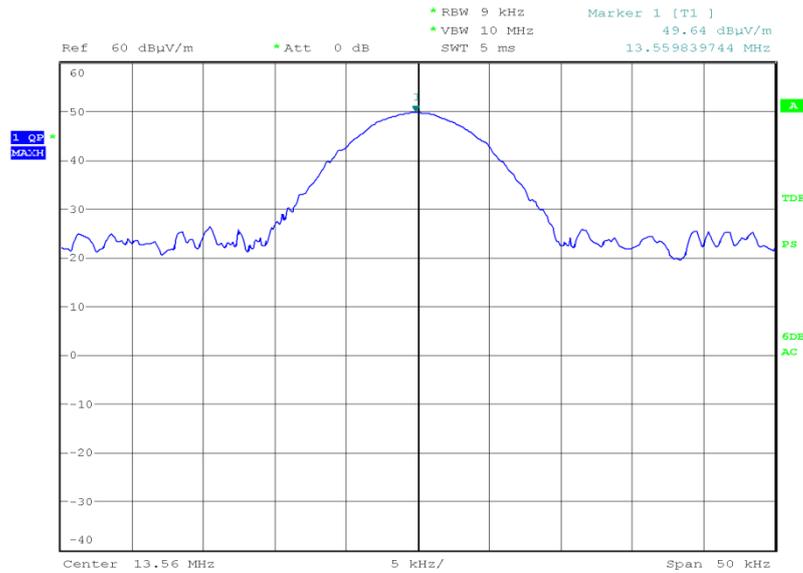
Ambient Temperature	20.9°C
Relative Humidity	30.0%



2.1.7 Test Results

4.0 V DC Supply

Carrier



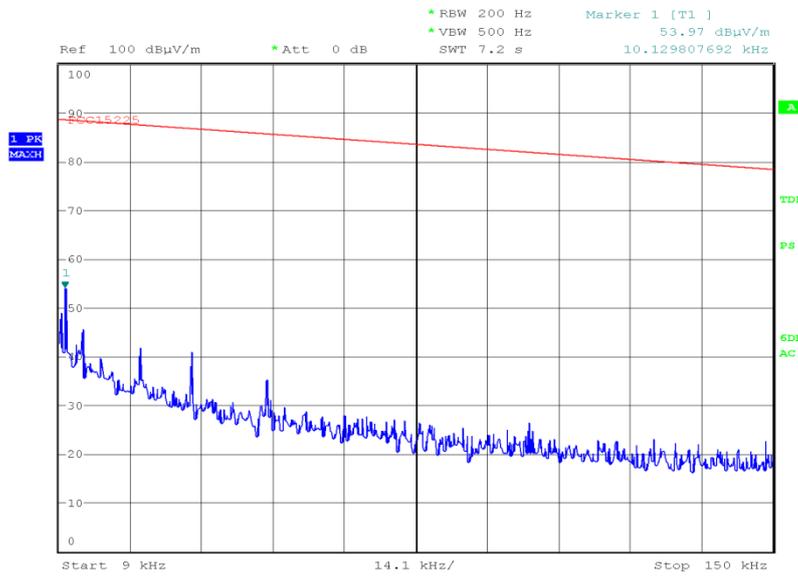
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Frequency (MHz)	QP Level (dBµV/m) at 3m	QP Level (µV/m) at 30m *	QP Limit (dBµV/m) at 3m	QP Limit (µV/m) at 30m	Angle (deg)	Height (m)	Polarity
13.56	49.64	30.34	104	15848	187	1.50	Face

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

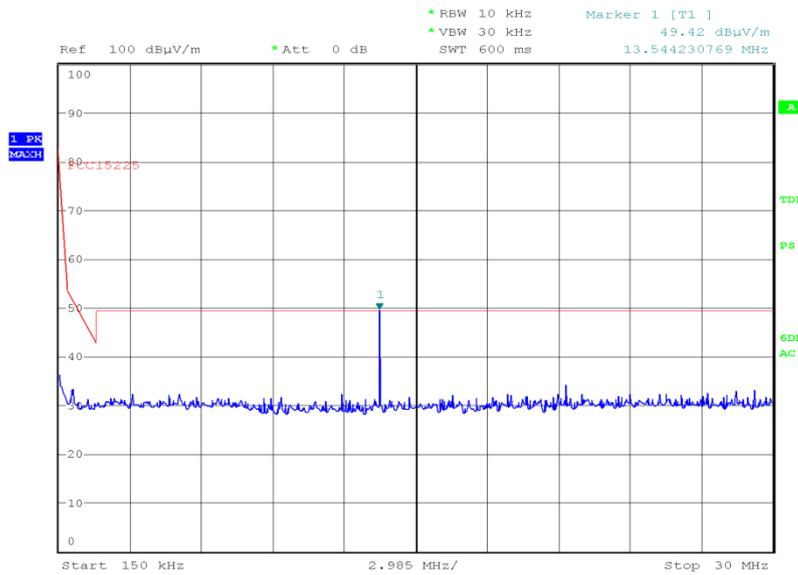


9 kHz to 150 kHz



Date: 14.APR.2014 22:45:11

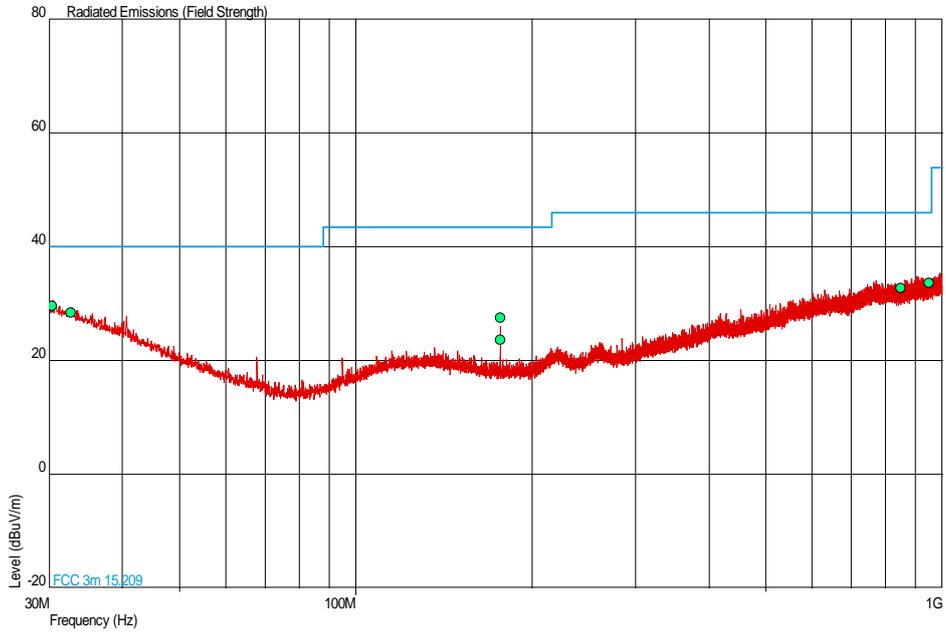
150 kHz to 30MHz



Date: 14.APR.2014 22:33:51



30 MHz to 1 GHz



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
30.328	29.7	30.5	40.0	100	-10.3	-69.5	8	1.00	Vertical
32.678	28.5	26.6	40.0	100	-11.5	-73.4	126	1.00	Horizontal
176.262	23.6	15.1	43.5	150	-19.9	-134.9	328	1.16	Vertical
176.279	27.5	23.7	43.5	150	-16.0	-126.3	32	2.13	Horizontal
848.695	32.8	43.7	46.0	200	-13.2	-156.3	169	1.00	Horizontal
947.844	33.7	48.4	46.0	200	-12.3	-151.6	190	1.00	Horizontal



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2.2 OCCUPIED BANDWIDTH

2.2.1 Specification Reference

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

2.2.2 Equipment Under Test and Modification State

SHL25 S/N: IMEI 004401115170231 - Modification State 0

2.2.3 Date of Test

25 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

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 15.215 (c).

The EUT was connected to a spectrum analyser via a test jig. The EUT was transmitting at maximum power with normal modulation. The resultant trace was displayed on screen and the peak point of the trace was measured and the markers positioned to give the -20 dBc points of the displayed spectrum.

2.2.6 Environmental Conditions

Ambient Temperature	24.7°C
Relative Humidity	37.5%

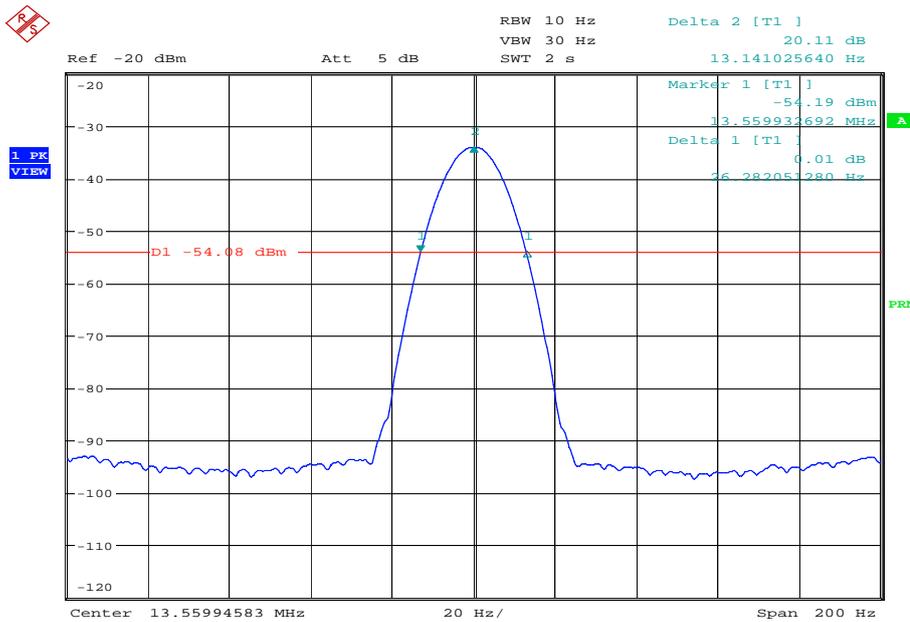


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2.2.7 Test Results

4.0 V DC Supply

Frequency (MHz)	20 dB Bandwidth (Hz)
13.56	26.28



Date: 25.APR.2014 11:28:32



2.3 FREQUENCY STABILITY UNDER TEMPERATURE VARIATIONS

2.3.1 Specification Reference

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

2.3.2 Equipment Under Test and Modification State

SHL25 S/N: IMEI 004401115170231 - Modification State 0

2.3.3 Date of Test

30 April 2014

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 EUT was set to transmit with normal modulation using a fully charged battery. The EUT was connected to a spectrum analyser via a test jig. The FM demod function of the spectrum analyser was used and the frequency error was recorded. The measurement was repeated with the temperature adjusted between -20°C and +50°C in 10° steps as per 15.225 (e).

2.3.6 Environmental Conditions

Ambient Temperature	22.8°C
Relative Humidity	41.5%



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2.3.7 Test Results

4.0 V DC Supply

RFID

Temperature Interval (°C)	Test Frequency (MHz)	Deviation (%)
-20	13.559962	-0.00028
-10	13.559963	-0.00027
0	13.559973	-0.00020
+10	13.559972	-0.00020
+20	13.559950	-0.00037
+30	13.559911	-0.00066
+40	13.559885	-0.00085
+50	13.559866	-0.00099

Limit Clause

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ 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- Field Strength of any Emission					
Antenna (Active Loop, 9kHz-30MHz)	Rohde & Schwarz	HFH2-Z2	333	24	30-Oct-2014
Antenna (Dish/Tripod/Adaptor, 1GHz-18GHz)	Rohde & Schwarz	AC-008	334	-	TU
Screened Room (5)	Rainford	Rainford	1545	24	10-Jan-2015
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
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	-	TU
Tilt Antenna Mast	matur GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	matur GmbH	NCD	3917	-	TU
Section 2.2 - Occupied Bandwidth					
Multimeter	White Gold	WG022	190	12	28-Oct-2014
RF Coupler	TUV SUD Product Service	TUV	415	-	TU
Communications Tester	Rohde & Schwarz	CMU 200	442	12	8-Nov-2014
Attenuator (10dB)	Weinschel	47-10-34	481	12	28-Mar-2015
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	30-Oct-2014
Power Divider	Weinschel	1506A	604	12	23-May-2014
Power Supply Unit	Farnell	H60-25	1092	-	O/P Mon
Spectrum Analyser	Agilent Technologies	E4407B	1154	12	13-Aug-2014
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	22-Jul-2014
Power Supply Unit	Farnell	TSV-70	2043	-	O/P Mon
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	15-Nov-2014
Hygrometer	Rotronic	I-1000	2891	12	8-Jul-2014
Power Supply	Farnell	LT30-2	2903	-	TU
Radio Communications Test Set	Rohde & Schwarz	CMU 200	3035	12	25-Oct-2014
Multimeter	Fluke	79 Series II	3057	12	24-Sep-2014
Attenuator (30dB/50W)	Aeroflex / Weinschel	47-30-34	3164	12	12-Dec-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Attenuator (10dB, 20W)	Lucas Weinschel	1	3225	12	12-Dec-2014
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	13-Sep-2014
'N' - 'N' RF Cable (1m)	Rhophase	NPS-1803-1000-NPS	3701	12	6-Mar-2015
Combiner/Splitter	Weinschel	1506A	3878	12	21-Mar-2015
2 Metre SMA Type Cable	Rhophase	3PS-1801A-2000-3PS	4111	12	5-Nov-2014
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	4143	12	22-Jul-2014
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	18-Sep-2014
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	22-Jul-2014
PXA Signal Analyser	Agilent Technologies	N9030A PXA	4409	12	27-Feb-2015



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Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.3 - Frequency Stability Under Temperature Variations					
Digital Temperature Indicator + T/C	Fluke	51	412	12	12-Feb-2015
RF Coupler	TUV SUD Product Service	TUV	415	-	TU
Temperature Chamber	Montford	2F3	467	-	O/P Mon
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	22-Jul-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	4-Jul-2014
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	22-Jul-2014

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 Stability Under Temperature Variations	± 3.54 Hz
Field Strength of any Emission	9 kHz to 1 GHz: ± 5.1 dB
Occupied Bandwidth	± 16.74 kHz



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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.

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