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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 15C (FeliCa)

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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 15C (FeliCa)

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February 2014

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

Test Engineer(s);

T Guy

M Russell

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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 15C (FeliCa)



Product Service

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 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)	SHL24
Serial Number(s)	IMEI 004401115003705 IMEI 004401115003788
Number of Samples Tested	2
Test Specification/Issue/Date	FCC CFR 47 Part 15C (2012)
Disposal	Held Pending Disposal
Reference Number	Not Applicable
Date	Not Applicable
Order Number	9952
Date	25 November 2013
Start of Test	9 January 2014
Finish of Test	16 January 2014
Name of Engineer(s)	T Guy M Russell
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 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
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(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 15C (FeliCa)



Product Service

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

SHL24 S/N: IMEI 004401115003705 - Modification State 0

2.1.3 Date of Test

15 January 2014 & 16 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 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.

2.1.6 Environmental Conditions

Ambient Temperature	21.6°C
Relative Humidity	3.0 - 36.0%

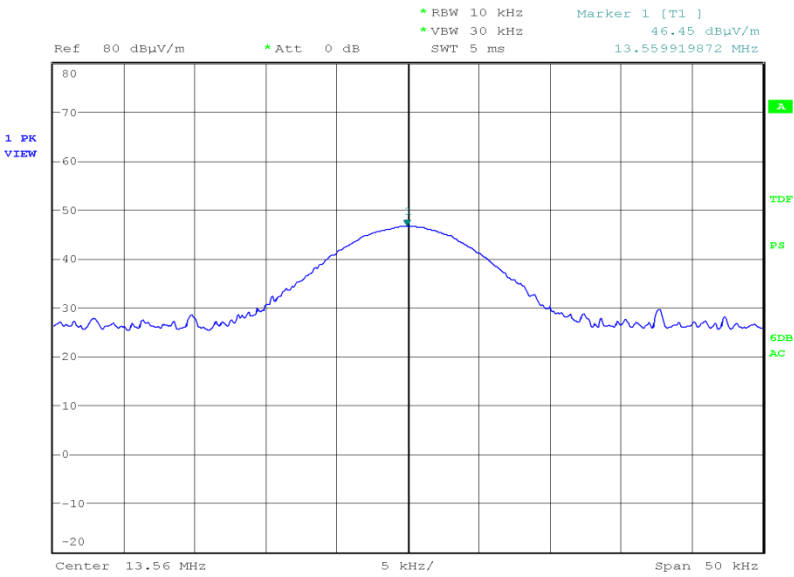


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2.1.7 Test Results

4.0 V DC Supply

Carrier

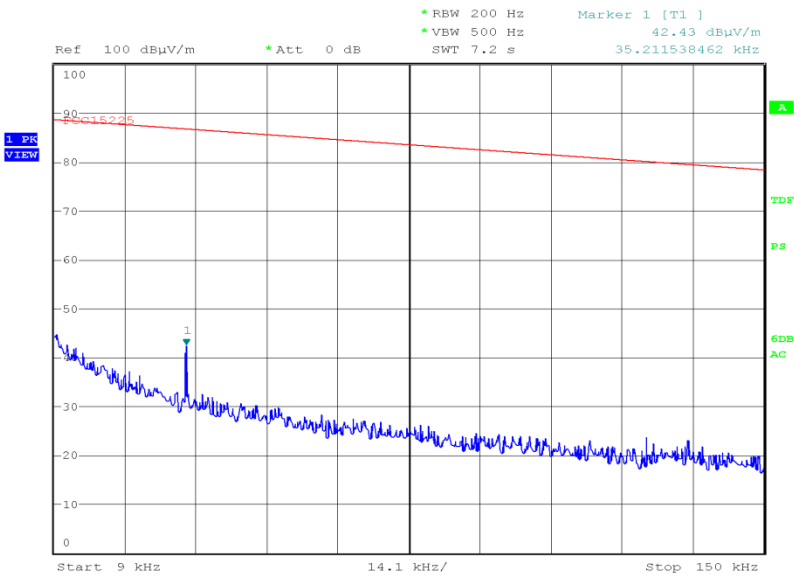


Date: 15.JAN.2014 21:43:57



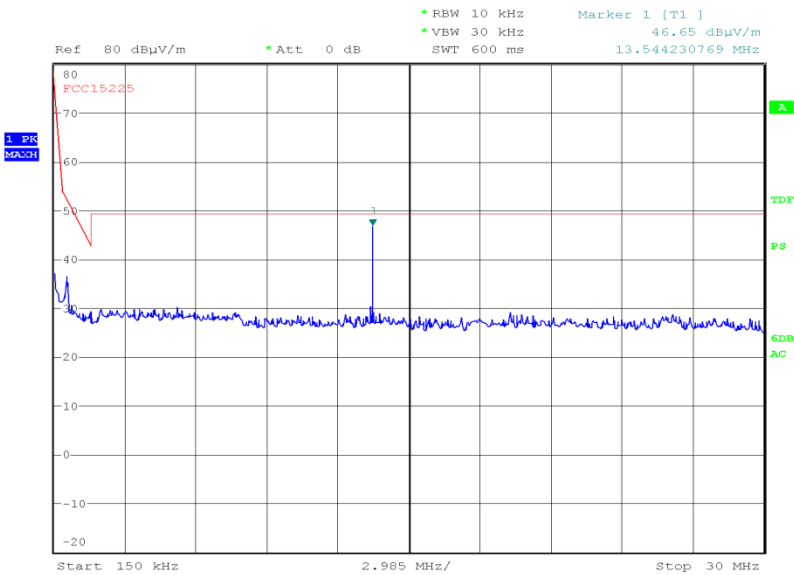
Product Service

9 kHz to 150 kHz

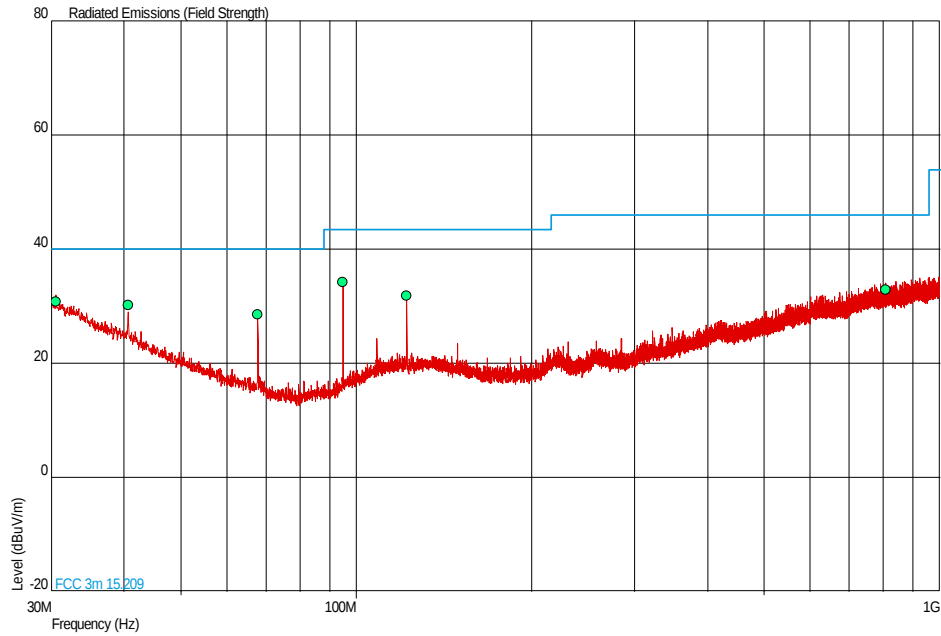


Date: 15.JAN.2014 21:56:10

150 kHz to 30 MHz



Date: 15.JAN.2014 21:49:48

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
30.584	30.8	34.7	40.0	100	-9.2	65.3	8	1.00	Vertical
40.673	30.2	32.4	40.0	100	-9.8	67.6	266	1.00	Vertical
67.799	28.6	26.9	40.0	100	-11.4	73.1	328	1.73	Vertical
94.920	34.2	51.3	43.5	150	-9.3	98.7	318	1.00	Vertical
122.038	31.8	38.9	43.5	150	-11.7	111.1	187	1.02	Vertical
807.998	32.9	44.2	46.0	200	-13.1	155.8	313	1.00	Vertical



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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

SHL24 S/N: IMEI 004401115003788 - Modification State 0

2.2.3 Date of Test

9 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

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 15C and ANSI C63.10.

The EUT was transmitting at maximum power, via a cable to the Spectrum Analyser. The Analyser settings were adjusted to display the resultant trace on screen. The peak point of the trace was measured and the markers positioned to give the -20dBc points of the displayed spectrum. The test was performed with a modulated carrier.

The plot of the following pages shows the resultant display from the Spectrum Analyser.

2.2.6 Environmental Conditions

Ambient Temperature	24.6°C
Relative Humidity	26.7%

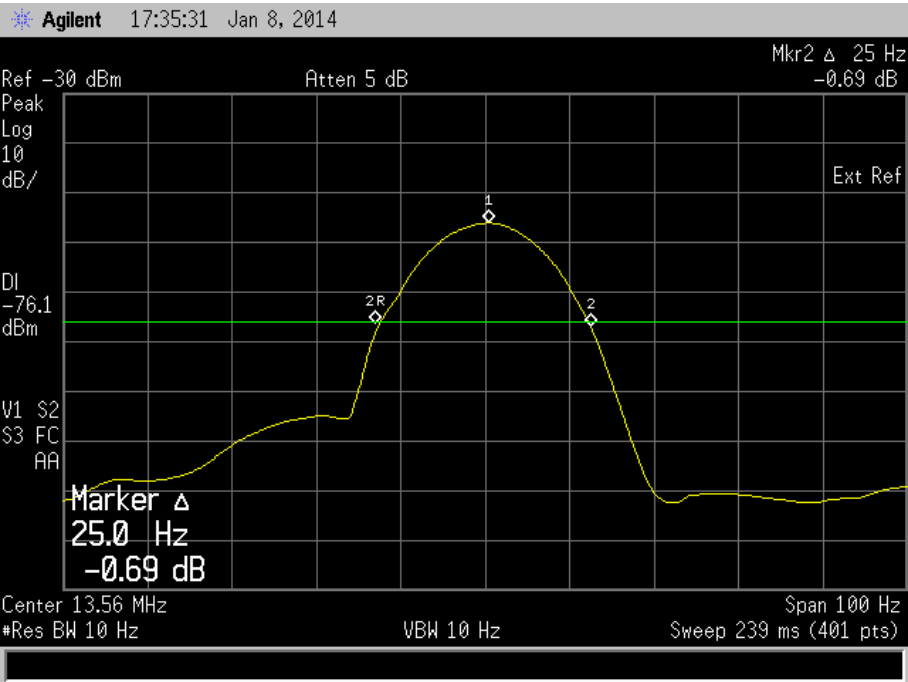


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2.2.7 Test Results

4.0 V DC Supply

Frequency (MHz)	20 dB Bandwidth (Hz)
13.56	25





Product Service

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

SHL24 S/N: IMEI 004401115003788 - Modification State 0

2.3.3 Date of Test

9 January 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 on maximum power with normal modulation. An frequency counter, was used to measure the frequency error. The temperature was adjusted between -20°C and +50°C in 10° steps as per 15.225 (e).

2.3.6 Environmental Conditions

Ambient Temperature	20.3°C
Relative Humidity	30.6%



2.3.7 Test Results

4.0 V DC Supply

RFID

Temperature Interval (°C)	Test Frequency (MHz)	Deviation (%)
-20	13.56	0.00008
-10	13.56	0.00020
0	13.56	0.00055
+10	13.56	0.00044
+20	13.56	0.00018
+20	13.56	0.00018
+20	13.56	0.00018
+30	13.56	0.00007
+40	13.56	-0.00029
+50	13.56	-0.00052

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 (Bilog)	Schaffner	CBL6143	287	24	18-Jan-2014
Dual Power Supply Unit	Thurlby	PL320	288	-	TU
Antenna (Active Loop, 9kHz-30MHz)	Rohde & Schwarz	HFH2-Z2	333	24	30-Oct-2014
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
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
Section 2.2- Occupied Bandwidth					
Multimeter	White Gold	WG022	190	12	28-Oct-2014
RF Coupler	TUV SUD Product Service	RFC1	414	-	TU
Power Supply Unit	Hewlett Packard	6253A	441	-	O/P Mon
Attenuator (10dB, 10W)	Texscan	HFP-50N	468	12	27-Jun-2014
Spectrum Analyser	Agilent Technologies	E4407B	1154	12	13-Aug-2014
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	24-Jan-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Power Divider	Weinschel	1506A	3345	12	23-May-2014
DC - 12.4 GHz 10 dB Attenuator	Suhner	6810.17.A	3965	12	17-Oct-2014
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	4143	12	22-Jul-2014
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	4144	12	17-Jul-2014
Section 2.3 - Frequency Stability Under Temperature Variations					
RF Coupler	TUV SUD Product Service	RFC1	414	-	TU
Temperature Chamber	Montford	2F3	467	-	O/P Mon
Spectrum Analyser	Agilent Technologies	E4407B	1154	12	13-Aug-2014
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	24-Jan-2014
Digital Temperature Indicator	Fluke	51	2267	12	11-Sep-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	$\pm 3.54 \text{ Hz}$
Field Strength of any Emission	9 kHz to 1 GHz: $\pm 5.1 \text{ dB}$
Occupied Bandwidth	$\pm 16.74 \text{ kHz}$



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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.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

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