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Report On

Limited FCC Testing of the
Sharp 205SH AXGP & Quad-band WCDMA (FDD I/FDD V/FDD
VIII/FDD XI) Dual-mode Cellular Phone with Bluetooth, WLAN, Felica
and GPS

In accordance with FCC CFR 47 Part 15C (FeliCa)

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DATED

10 May 2013

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);

S Hartley

M Russell





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SECTION 1

REPORT SUMMARY

Limited FCC Testing of the
Sharp 205SH AXGP & Quad-band WCDMA (FDD I/FDD V/FDD VIII/FDD XI) Dual-mode
Cellular Phone with Bluetooth, WLAN, Felica and GPS
In accordance with FCC CFR 47 Part 15C (FeliCa)



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Limited FCC Testing of the Sharp 205SH AXGP & Quad-band WCDMA (FDD I/FDD V/FDD VIII/FDD XI) Dual-mode Cellular Phone with Bluetooth, WLAN, Felica and GPS to the requirements of FCC CFR 47 Part 15C.

Objective	To perform Limited 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)	205SH
Serial Number(s)	IMEI 004401114778737
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 15C (2012)
Disposal	Held Pending Disposal
Reference Number	Not Applicable
Date	Not Applicable
Order Number	9669
Date	22 April 2013
Start of Test	23 April 2013
Finish of Test	24 April 2013
Name of Engineer(s)	S Hartley 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 205SH Model Description Form.

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Sharp 205SH AXGP & Quad-band WCDMA (FDD I/FDD V/FDD VIII/FDD XI) Dual-mode Cellular Phone with Bluetooth, WLAN, 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.

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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

Limited FCC Testing of the
Sharp 205SH AXGP & Quad-band WCDMA (FDD I/FDD V/FDD VIII/FDD XI) Dual-mode
Cellular Phone with Bluetooth, WLAN, Felica and GPS
In accordance with FCC CFR 47 Part 15C (FeliCa)



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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

205SH S/N: IMEI 004401114778737 - Modification State 0

2.1.3 Date of Test

23 April 2013

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

For conducted emissions, the EUT was set to operate at maximum power on the worst case data rate. The test was performed on the bottom, middle and top channels. The test was performed from 9 kHz to 25 GHz. Firstly, the power of each fundamental frequency was measured in 100 kHz bandwidth and this was used to show a -20 dBc limit line on the trace. The measurement path loss in each relevant frequency band was measured and entered as a reference level offset.

For radiated emissions, the test method described above was also used. However, the measurement was performed from 30 MHz to 25 GHz and the path loss is incorporated as a transducer factor and entered into the spectrum analyser.

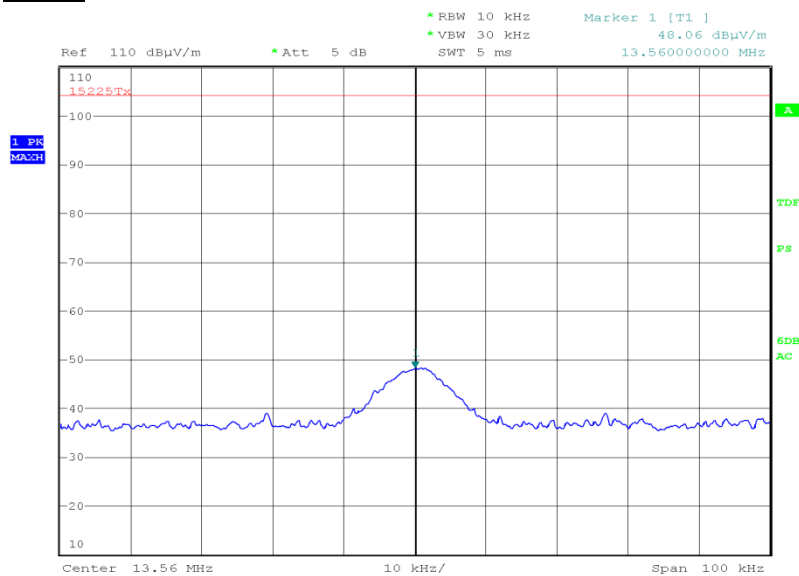
The band edge measurements were performed in accordance with ANSI C63.10, Clause 6.9.3. The results were analysed to ensure compliance with restricted bands. The EUT was set to the lowest and highest operating frequencies.

2.1.6 Environmental Conditions

Ambient Temperature	21.0°C
Relative Humidity	38.0%

2.1.7 Test Results

4.0 V DC Supply

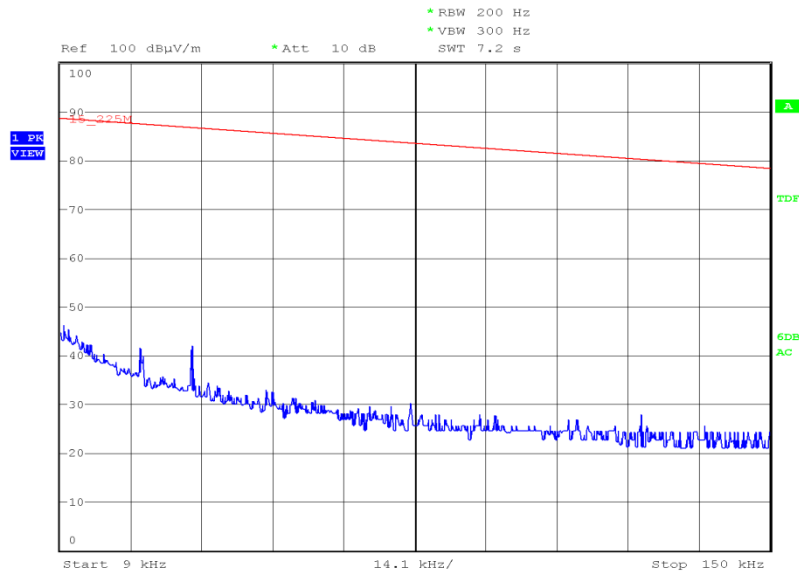
Carrier

Date: 23.APR.2013 14:28:51

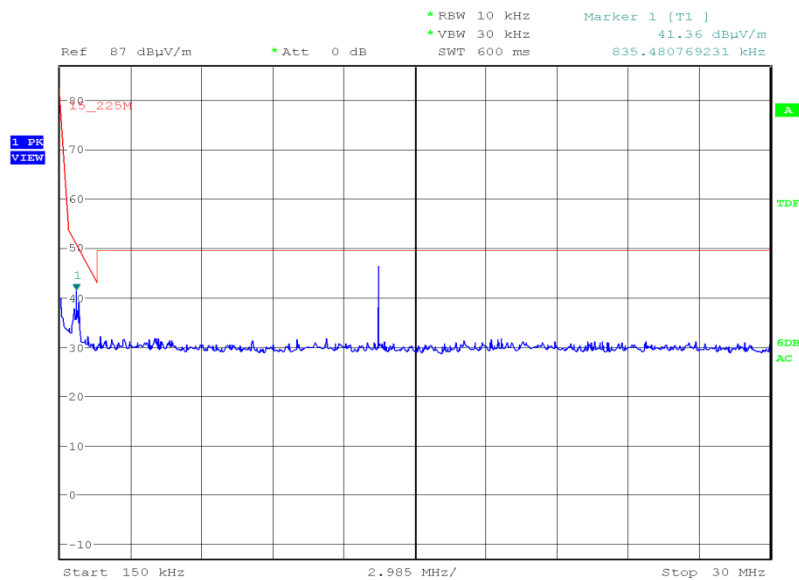
Frequency (MHz)	QP Level (dBμV/m) at 3m	QP Level (μV/m) at 3m	QP Limit (dBμV/m) at 3m	QP Limit (μV/m) at 30m	Angle (deg)	Height (m)	Polarity
13.560	47.12	226.99	104.00	15848.00	93	1.5	Edge On
13.560	48.06	252.93	104.00	15848.00	0	1.5	Face On



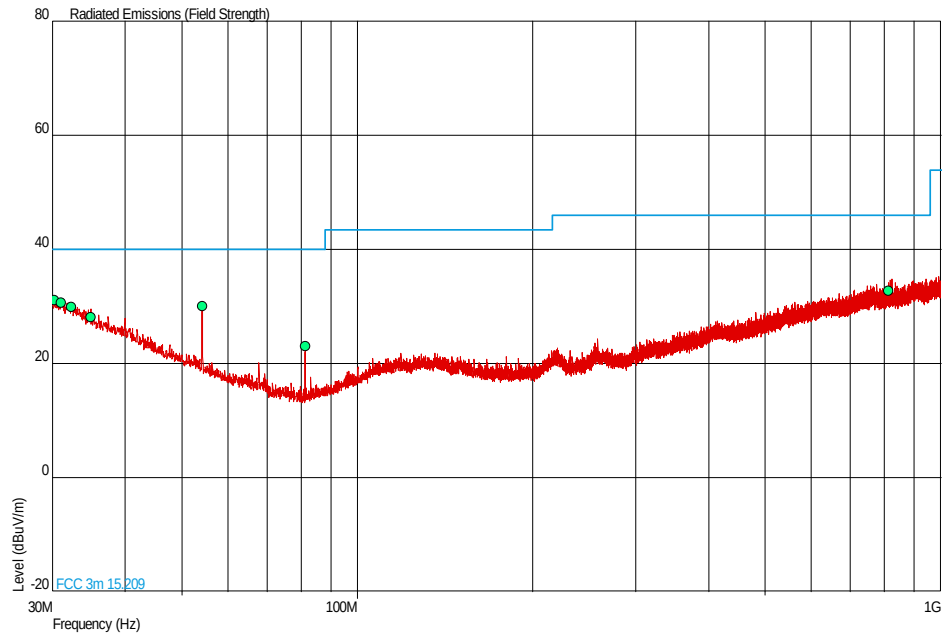
Product Service

9 kHz to 150 kHz

Date: 23.APR.2013 16:10:52

150 kHz to 30 MHz

Date: 23.APR.2013 15:14:55

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
30.269	31.2	36.3	40.0	100	-8.8	63.7	286	1.28	Vertical
31.112	30.6	33.9	40.0	100	-9.4	66.1	264	1.00	Vertical
32.379	29.9	31.3	40.0	100	-10.1	68.7	207	1.00	Vertical
34.899	28.1	25.4	40.0	100	-11.9	74.6	102	1.00	Vertical
54.248	30.1	32.0	40.0	100	-9.9	68.0	360	1.00	Vertical
81.364	23.1	14.3	40.0	100	-16.9	85.7	0	1.48	Vertical
813.706	32.7	43.2	46.0	200	-13.3	156.8	66	1.19	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

205SH S/N: IMEI 004401114778737 - Modification State 0

2.2.3 Date of Test

24 April 2013

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, at all data rates 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 an unmodulated carrier.

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

2.2.6 Environmental Conditions

Ambient Temperature	23.9°C
Relative Humidity	37.4%

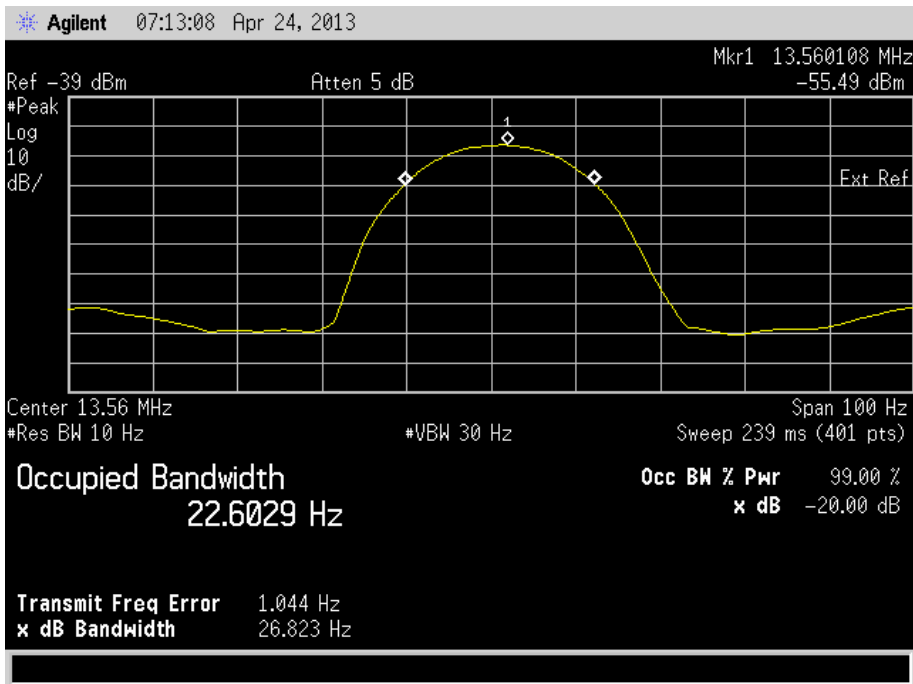


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2.2.7 Test Results

4.0 V DC Supply

Frequency (MHz)	20 dB Bandwidth (Hz)
13.56	22.6029





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

205SH S/N: IMEI 004401114778737 - Modification State 0

2.3.3 Date of Test

24 April 2013

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	22.8°C
Relative Humidity	45.5%



2.3.7 Test Results

4.0 V DC Supply

RFID

Temperature Interval (°C)	Test Frequency (MHz)	Deviation (%)
-20	13.560056	0.000413
-10	13.559929	-0.000524
0	13.559910	0.000664
+10	13.560148	0.001090
+20	13.560119	0.001460
+20	13.560119	0.001460
+30	13.560096	0.000708
+40	13.560066	0.000487
+50	13.560054	0.000398

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 (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	3-Apr-2014
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	12	9-Nov-2013
Dual Power Supply Unit	Thurlby	PL320	288	-	TU
Antenna (Active Loop, 9kHz-30MHz)	Rohde & Schwarz	HFH2-Z2	333	24	30-Oct-2014
Filter (High Pass)	Lorch	SHP7-7000-SR	566	12	20-Feb-2014
Antenna (Double Ridge Guide)	Q-Par Angus Ltd	QSH 180K	1511	24	7-Nov-2014
Pre-Amplifier	Phase One	PS04-0086	1533	12	27-Sep-2013
Pre-Amplifier	Phase One	PS04-0087	1534	12	28-Sep-2013
Screened Room (5)	Rainford		1545	36	25-Dec-2013
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	12-May-2013
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	3171	12	30-Aug-2013
Amplifier (1 - 8GHz)	Phase One	PS06-0060	3175	12	10-Jul-2013
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	11-Oct-2013
3 GHz High Pass Filter	K&L Microwave	11SH10-3000/X18000-O/O	3552	12	1-Feb-2014
500N compact force gauge	Mecmesin	Mecmesin 500N	3717	12	4-Oct-2013
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
1 metre, SMA to SMA	Suhner	Sucoflex armoured cable	4048	-	O/P Mon
1 Metre SMA Cable	Rhophase	3PS-1801A-1000-3PS	4101	12	25-Oct-2013
Section 2.2 - Occupied Bandwidth					
Power Supply Unit	Farnell	H60-25	1092	-	O/P Mon
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	23-Jul-2013
Multimeter	Iso-tech	IDM101	2424	12	10-Sep-2013
Hygrometer	Rotronic	I-1000	3220	12	13-Jun-2013
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	9-May-2013
Combiner/Splitter	Weinschel	1506A	3878	12	19-Mar-2014
DC - 12.4 GHz 10 dB Attenuator	Suhner	6810.17.A	3965	12	27-Jun-2013
P-Series Power Meter	Agilent	N1911A	3981	12	17-Sep-2013
Section 2.3 - Frequency Stability Under Temperature Variations					
Climatic Chamber	Votsch	VT4002	161	-	O/P Mon
RF Coupler	TUV SUD Product Service	RFC1	414	-	TU
Spectrum Analyser	Hewlett Packard	E4407B	1154	12	17-Jul-2013
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	23-Jul-2013
Thermocouple Thermometer	Fluke	51	3172	12	30-Jul-2013

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.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA
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