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Report On

FCC Testing of the Sharp Hep-band LTE (B1 / B3 / B5 / B13 / B17 / B26 / B38), Dual-band WCDMA (FDD I / V), Quad-band GSM (850 / 900 / 1800 / 1900) & WiMAX2+ (TDD41) multi mode Smart phone with Bluetooth, WLAN, SRD(NFC, FeliCa) and GPS
In accordance with FCC 47 CFR Part 15B

COMMERCIAL-IN-CONFIDENCE

FCC ID: APYHRO00234

Document 75933606 Report 15 Issue 1

May 2016



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DATED

05 May 2016

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

T Guy





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SECTION 1

REPORT SUMMARY

FCC Testing of the
Sharp Hep-band LTE (B1 / B3 / B5 / B13 / B17 / B26 / B38), Dual-band WCDMA (FDD I / V),
Quad-band GSM (850 / 900 / 1800 / 1900) & WiMAX2+ (TDD41) multi mode Smart phone with
Bluetooth, WLAN, SRD(NFC, FeliCa) and GPS
In accordance with FCC 47 CFR Part 15B



1.1 INTRODUCTION

The information contained in this report is intended to show the verification of FCC Testing of the Sharp Hep-band LTE (B1 / B3 / B5 / B13 / B17 / B26 / B38), Dual-band WCDMA (FDD I / V), Quad-band GSM (850 / 900 / 1800 / 1900) & WiMAX2+ (TDD41) multi mode Smart phone with Bluetooth, WLAN, SRD(NFC, 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
Serial Number(s)	IMEI 004401115723716
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15B (2015)
Disposal	Held Pending Disposal
Reference Number	Not Applicable
Date	Not Applicable
Order Number	10749
Date	15 February 2016
Start of Test	14 April 2016
Finish of Test	18 April 2016
Name of Engineer(s)	G Lawler T Guy
Related Document(s)	ANSI C63.4 (2014)



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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	



1.3 PRODUCT TECHNICAL DESCRIPTION

Refer to Model Description APYHRO00234 Rev 4.0 document.

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Sharp Hep-band LTE (B1 / B3 / B5 / B13 / B17 / B26 / B38), Dual-band WCDMA (FDD I / V), Quad-band GSM (850 / 900 / 1800 / 1900) & WiMAX2+ (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 Hep-band LTE (B1 / B3 / B5 / B13 / B17 / B26 / B38), Dual-band WCDMA (FDD I / V),
Quad-band GSM (850 / 900 / 1800 / 1900) & WiMAX2+ (TDD41) multi mode Smart phone with
Bluetooth, WLAN, SRD(NFC, 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

S/N: IMEI 004401115723716 - Modification State 0

2.1.3 Date of Test

18 April 2016

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 Clause 15.107 of FCC 47 CFR Part 15.

2.1.6 Environmental Conditions

Ambient Temperature	18.6°C
Relative Humidity	30.0%

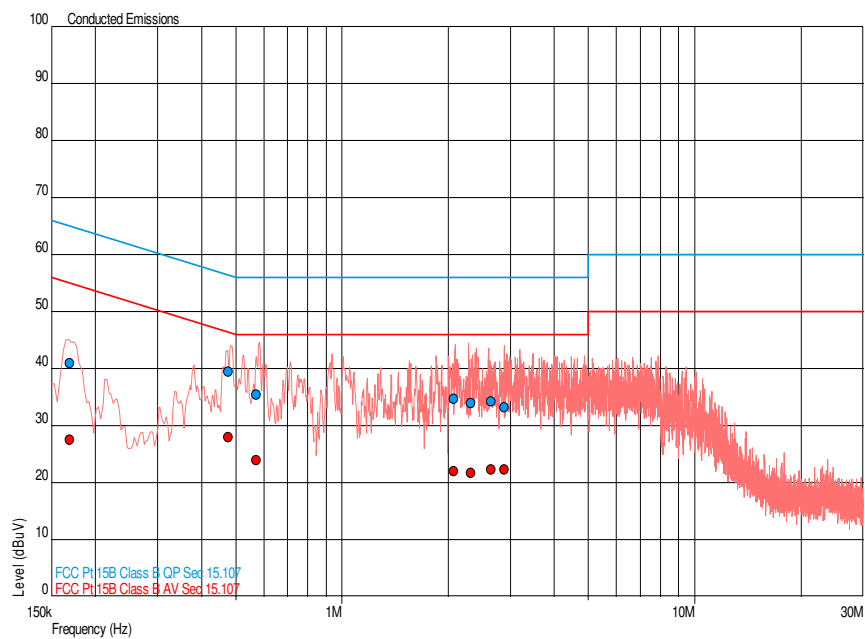


2.1.7 Test Results

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

Frequency (MHz)	QP Level (dBμV)	QP Limit (dBμV)	QP Margin (μV/m)	AV Level (dBμV)	AV Limit (dBμV)	AV Margin (dBμV)
0.169	41.0	65.0	-24.0	27.5	55.0	-27.5
0.476	39.5	56.4	-16.9	28.0	46.4	-18.4
0.573	35.4	56.0	-20.6	24.0	46.0	-22.0
2.076	34.8	56.0	-21.2	22.0	46.0	-24.0
2.318	34.0	56.0	-22.0	21.8	46.0	-24.2
2.640	34.3	56.0	-21.7	22.3	46.0	-23.7
2.882	33.2	56.0	-22.8	22.2	46.0	-23.8

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

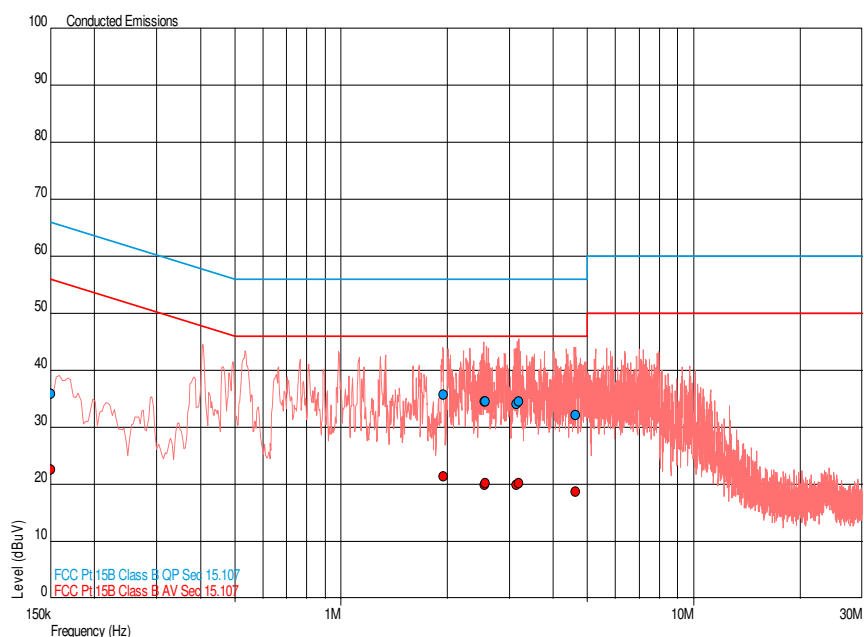




AC Powered/USB with GPS Rx Operational, Neutral Line Results

Frequency (MHz)	QP Level (dBμV)	QP Limit (dBμV)	QP Margin (μV/m)	AV Level (dBμV)	AV Limit (dBμV)	AV Margin (dBμV)
0.150	35.8	66.0	-30.2	22.6	56.0	-33.4
1.946	35.7	56.0	-20.3	21.4	46.0	-24.6
2.547	34.6	56.0	-21.4	20.0	46.0	-26.0
2.563	34.5	56.0	-21.5	20.2	46.0	-25.8
3.139	34.1	56.0	-21.9	20.0	46.0	-26.0
3.191	34.6	56.0	-21.4	20.2	46.0	-25.8
4.626	32.1	56.0	-23.9	18.7	46.0	-27.3

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

S/N: IMEI 004401115723716 - Modification State 0

2.2.3 Date of Test

14 April 2016 & 17 April 2016

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

When frequencies greater than 18 GHz were measured the EUT was positioned 1 m above the horizontal reference ground plane.

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	19.2 - 21.8°C
Relative Humidity	35.4 - 35.7%



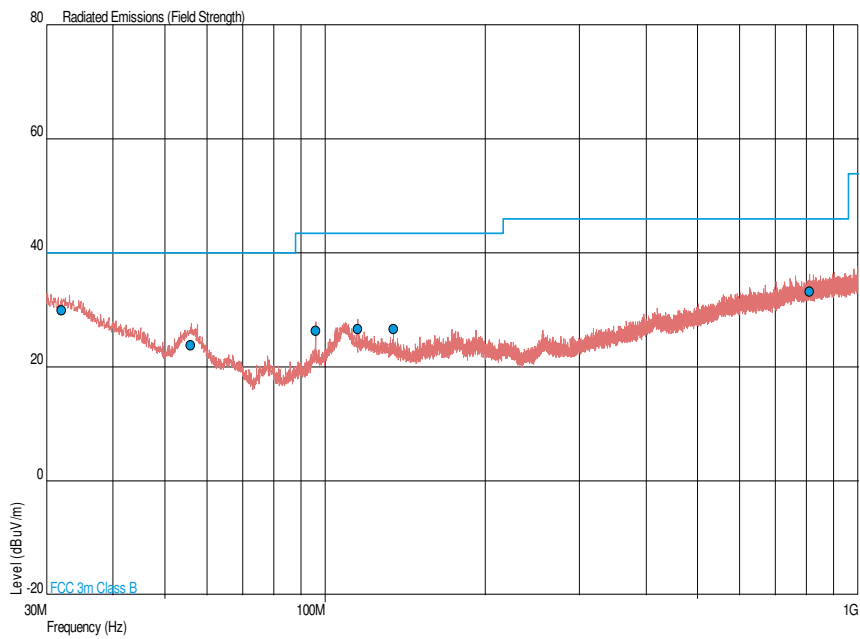
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2.2.7 Test Results

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

Frequency (MHz)	Quasi-Peak Level (dBμV/m)	Quasi-Peak Level (μV/m)	Quasi-Peak Margin (dμV/m)	Quasi-Peak Margin (μV/m)	Angle (°)	Height (m)	Polarisation
31.983	29.9	31.3	-10.1	-68.7	183	1.00	Horizontal
55.890	23.8	15.5	-16.2	-84.5	6	1.00	Vertical
95.998	26.4	20.9	-17.1	-129.1	166	1.00	Vertical
115.209	26.7	21.6	-16.8	-128.4	327	1.87	Vertical
134.402	26.6	21.4	-16.9	-128.6	352	1.00	Vertical
811.341	33.2	45.7	-12.8	-154.3	281	1.00	Vertical

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



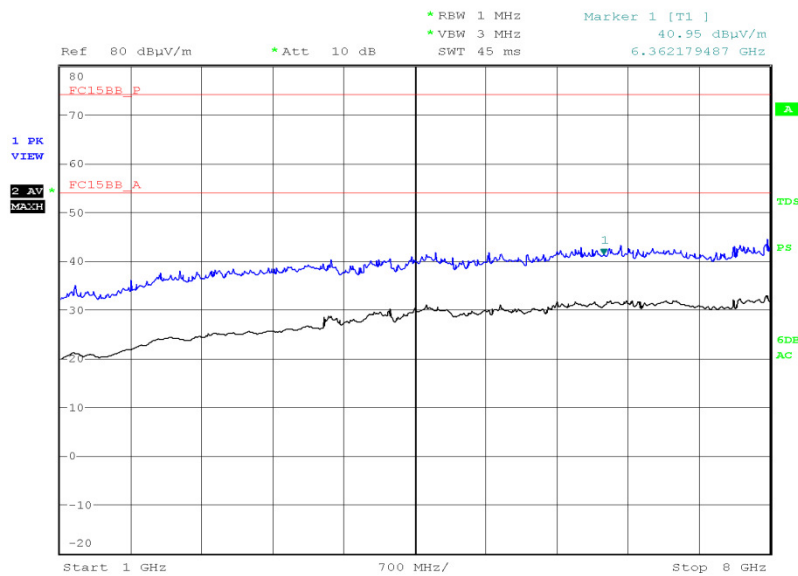


AC Powered/USB with GPS Rx Operational, 1 GHz to 13 GHz Results

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

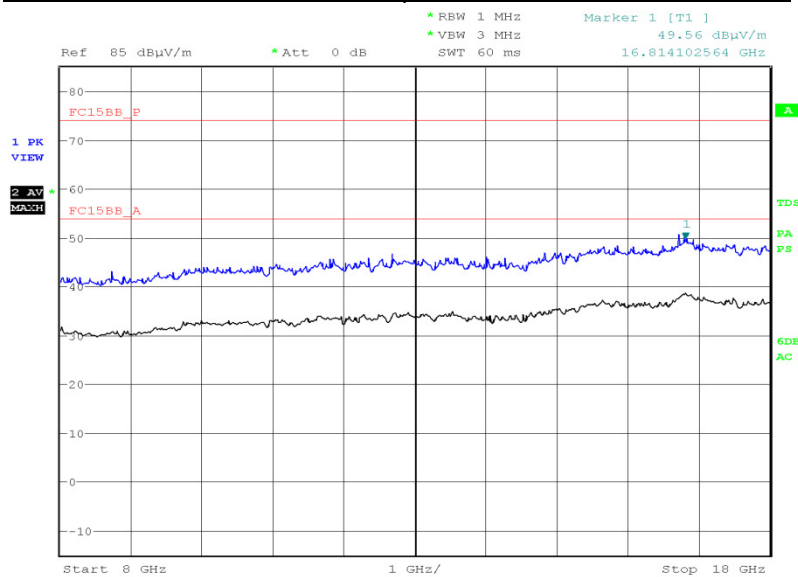
*No emissions were detected within 10 dB of the limit.

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



Date: 14.APR.2016 03:15:52

AC Powered/USB with GPS Rx Operational, 8 GHz to 18 GHz Plot

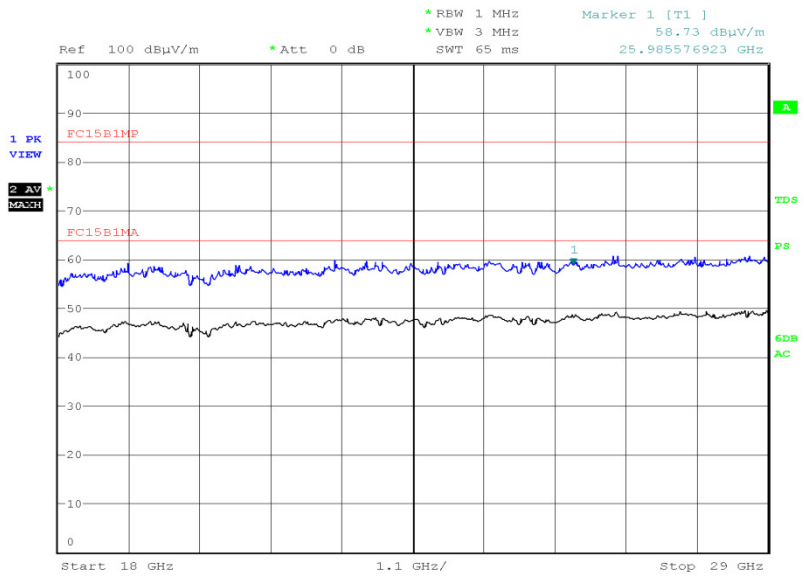


Date: 14.APR.2016 02:54:41



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AC Powered/USB with GPS Rx Operational, 18 GHz to 29 GHz Plot



Date: 16.APR.2016 23:23:34

FCC 47 CFR Part 15, Limit Clause 15.109

Class B

Frequency of Emission (MHz)	Field Strength ($\mu\text{V/m}$)
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
Section 2.1 – AC Line Conducted Emissions					
LISN	Rohde & Schwarz	ESH2-Z5	17	12	11-Feb-2017
Screened Room (5)	Rainford	Rainford	1545	36	20-Dec-2017
Transient Limiter	Hewlett Packard	11947A	2377	12	16-Feb-2017
Multimeter	Iso-tech	IDM101	2417	12	29-Sep-2016
Hygrometer	Rotronic	A1	2677	12	11-Jun-2016
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	2-Nov-2016
7m Armoured RF Cable	SSI Cable Corp.	1501-13-13-7m WA(-)	3600	-	TU
Section 2.2 - Radiated Emissions					
Dual Power Supply Unit	Thurlby	PL320	288	-	TU
Antenna 18-40GHz (Double Ridge Guide)	Q-Par Angus Ltd	QSH 180K	1511	24	27-Nov-2016
Pre-Amplifier	Phase One	PS04-0086	1533	12	30-Jul-2016
18GHz - 40GHz Pre-Amplifier	Phase One	PS04-0087	1534	12	23-Dec-2016
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Filter (Hi Pass)	Lorch	9HP7-7000-SR	2833	12	5-Feb-2017
Antenna (Bilog)	Chase	CBL6143	2904	24	11-Jun-2017
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	2-Nov-2016
Tilt Antenna Mast	mature GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	mature GmbH	NCD	3917	-	TU
1GHz to 8GHz Low Noise Amplifier	Wright Technologies	APS04-0085	4365	12	6-Oct-2016
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	29-Dec-2016

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	± 3.2 dB
Radiated Emissions	30 MHz to 1 GHz: ± 5.1 dB 1 GHz to 40 GHz: ± 6.3 dB



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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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