



## TABLE OF CONTENTS

REVISION HISTORY..... 3

1 GENERAL DESCRIPTION ..... 4

    1.1 Applicant ..... 4

    1.2 Manufacturer ..... 4

    1.3 Product Feature of Equipment Under Test..... 4

    1.4 Product Specification subjective to this standard ..... 4

    1.5 Modification of EUT ..... 4

APPENDIX A. ORIGINAL REPORT





# 1 General Description

## 1.1 Applicant

Motorola Mobility, LLC

222 W Merchandise Mart Plaza, Suite 1800, Chicago, IL 60654, United States

## 1.2 Manufacturer

Motorola Mobility, LLC

222 W Merchandise Mart Plaza, Suite 1800, Chicago, IL 60654, United States

## 1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
Model Name	4595
FCC ID	IHDT56QG2
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA/LTE WLAN 11b/g/n HT20 Bluetooth v3.0 EDR Bluetooth v4.0 - LE
HW Version	P2B
EUT Stage	Production Unit

## 1.4 Product Specification subjective to this standard

Product Specification subjective to this standard	
Tx Frequency	LTE Band 4 : 1710.7 MHz ~ 1754.3 MHz LTE Band 7 : 2502.5 MHz ~ 2567.5 MHz
Rx Frequency	LTE Band 4 : 2110.7 MHz ~ 2154.3 MHz LTE Band 7 : 2622.5MHz ~ 2687.5 MHz
Bandwidth	LTE Band 4 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 7 : 5MHz / 10MHz / 15MHz / 20MHz
Type of Modulation	QPSK / 16QAM

## 1.5 Modification of EUT

No modifications are made to the EUT during all test items.



## **Appendix A. Original Report**

Please refer to Sporton report number FG542019-01B as below.



# FCC RF Test Report

**APPLICANT** : Motorola Mobility, LLC  
**EQUIPMENT** : Mobile Cellular Phone  
**BRAND NAME** : Motorola  
**MODEL NAME** : 4597  
**FCC ID** : IHDT56QG2  
**STANDARD** : 47 CFR Part 2, 27  
**CLASSIFICATION** : PCS Licensed Transmitter Held to Ear (PCE)

The product was received on Apr. 20, 2015 and completely tested on May 02, 2015. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA / EIA-603-C-2004 and the testing has shown the tested sample to be in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager



## **SPORTON INTERNATIONAL INC.**

**No. 52, Hwa Ya 1<sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.**



TABLE OF CONTENTS

REVISION HISTORY.....3
SUMMARY OF TEST RESULT .....4
1 GENERAL DESCRIPTION .....5
1.1 Applicant .....5
1.2 Manufacturer.....5
1.3 Product Feature of Equipment Under Test.....5
1.4 Product Specification subjective to this standard .....6
1.5 Modification of EUT .....6
1.6 Emission Designator.....6
1.7 Testing Location .....7
1.8 Applicable Standards.....7
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST .....8
2.1 Test Mode .....8
2.2 Connection Diagram of Test System.....9
2.3 Support Unit used in test configuration and system .....9
2.4 Measurement Results Explanation Example.....9
3 CONDUCTED TEST ITEMS .....10
3.1 Measuring Instruments .....10
3.2 Test Setup .....10
3.3 Test Result of Conducted Test .....10
3.4 Conducted Output Power .....11
3.5 Peak-to-Average Ratio .....12
3.6 Occupied Bandwidth.....13
3.7 Conducted Band Edge .....14
3.8 Conducted Spurious Emission .....15
3.9 Frequency Stability .....16
4 RADIATED TEST ITEMS .....17
4.1 Measuring Instruments .....17
4.2 Test Setup .....17
4.3 Test Result of Radiated Test .....17
4.4 Effective Radiated Power and Effective Isotropic Radiated Power .....18
4.5 Radiated Spurious Emission .....20
5 LIST OF MEASURING EQUIPMENT .....21
6 UNCERTAINTY OF EVALUATION .....22

APPENDIX A. TEST RESULTS OF CONDUCTED TEST

APPENDIX B. TEST RESULTS OF RADIATED TEST





**SUMMARY OF TEST RESULT**

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	Reporting Only	PASS	-
3.5	N/A	Peak-to-Average Ratio	Reporting Only	PASS	-
3.6	§2.1049	Occupied Bandwidth	Reporting Only	PASS	-
3.7	§2.1051 §27.53(g) §27.53(m)(4)	Conducted Band Edge Measurement (Band 4) (Band 7)	$< 43+10\log_{10}(P[\text{Watts}])$	PASS	-
3.8	§2.1051 §27.53(g)	Conducted Spurious Emission (Band 4)	$< 43+10\log_{10}(P[\text{Watts}])$	PASS	-
	§2.1051 §27.53(m)(4)	Conducted Spurious Emission (Band 7)	$< 55+10\log_{10}(P[\text{Watts}])$		
3.9	§2.1055 §27.54	Frequency Stability Temperature & Voltage	Within Authorized Band	PASS	-
4.4	§27.50(h)(2)	Equivalent Isotropic Radiated Power (Band 7)	EIRP < 2Watt	PASS	-
	§27.50(d)(4)	Equivalent Isotropic Radiated Power (Band 4)	EIRP < 1Watt		
4.5	§2.1053 §27.53(h)	Radiated Spurious Emission (Band 4)	$< 43+10\log_{10}(P[\text{Watts}])$	PASS	Under limit 15.05 dB at 10200.000 MHz
	§2.1053 §27.53(m)(4)	Radiated Spurious Emission (Band 7)	$< 55+10\log_{10}(P[\text{Watts}])$		



# 1 General Description

## 1.1 Applicant

Motorola Mobility, LLC

222 W Merchandise Mart Plaza, Suite 1800, Chicago, IL 60654, United States

## 1.2 Manufacturer

Motorola Mobility, LLC

222 W Merchandise Mart Plaza, Suite 1800, Chicago, IL 60654, United States

## 1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
Model Name	4597
FCC ID	IHDT56QG2
IMEI Code	355491060004274 (for Radiation test items) 355491060004191 (for Conducted test items)
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA/LTE WLAN 11b/g/n HT20 Bluetooth v3.0 EDR Bluetooth v4.0 - LE
HW Version	P2B
EUT Stage	Identical Prototype

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

Accessory List	
AC Adapter	Brand Name : Motorola
	Model Name : SPN5862A
USB Cable	Brand Name : Motorola
	Model Name : SKN6415A
Earphone	Brand Name : Motorola
	Model Name : SJYN1181B
Battery	Brand Name : Motorola
	Model Name : FC40



### 1.4 Product Specification subjective to this standard

Product Specification subjective to this standard	
<b>Tx Frequency</b>	LTE Band 4 : 1710.7 MHz ~ 1754.3 MHz LTE Band 7 : 2502.5 MHz ~ 2567.5 MHz
<b>Rx Frequency</b>	LTE Band 4 : 2110.7 MHz ~ 2154.3 MHz LTE Band 7 : 2622.5MHz ~ 2687.5 MHz
<b>Bandwidth</b>	LTE Band 4 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 7 : 5MHz/ 10MHz / 15MHz / 20MHz
<b>Maximum Output Power to Antenna</b>	LTE Band 4 : 23.32 dBm LTE Band 7 : 22.59 dBm
<b>Type of Modulation</b>	QPSK / 16QAM

### 1.5 Modification of EUT

No modifications are made to the EUT during all test items.

### 1.6 Emission Designator

LTE Band 4	QPSK			16QAM		
BW(MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)
1.4	1M10G7D	-	0.2723	1M10W7D	-	0.1884
3	2M73G7D	-	0.2748	2M73W7D	-	0.1849
5	4M51G7D	-	0.2858	4M51W7D	-	0.1811
10	9M05G7D	0.0020	0.2844	9M05W7D	-	0.1841
15	13M5G7D	-	0.2958	13M5W7D	-	0.1854
20	18M4G7D	-	0.2911	18M5W7D	-	0.1932
LTE Band 7	QPSK			16QAM		
BW(MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)
5	4M51G7D	-	0.2460	4M51W7D	-	0.1603
10	9M09G7D	-	0.2673	9M03W7D	-	0.1714
15	13M5G7D	0.0005	0.2742	13M5W7D	-	0.1702
20	18M5G7D	-	0.2547	18M5W7D	-	0.1687



### 1.7 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

<b>Test Site</b>	SPORTON INTERNATIONAL INC.
<b>Test Site Location</b>	No. 52, Hwa Ya 1 <sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978
<b>Test Site No.</b>	<b>Sporton Site No.</b>
	TH02-HY

<b>Test Site</b>	SPORTON INTERNATIONAL INC.
<b>Test Site Location</b>	No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd., Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-0855
<b>Test Site No.</b>	<b>Sporton Site No.</b>
	03CH11-HY

### 1.8 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR Part 2, 27
- ♦ ANSI / TIA / EIA-603-C-2004
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v02r02

**Remark:**

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



## 2 Test Configuration of Equipment Under Test

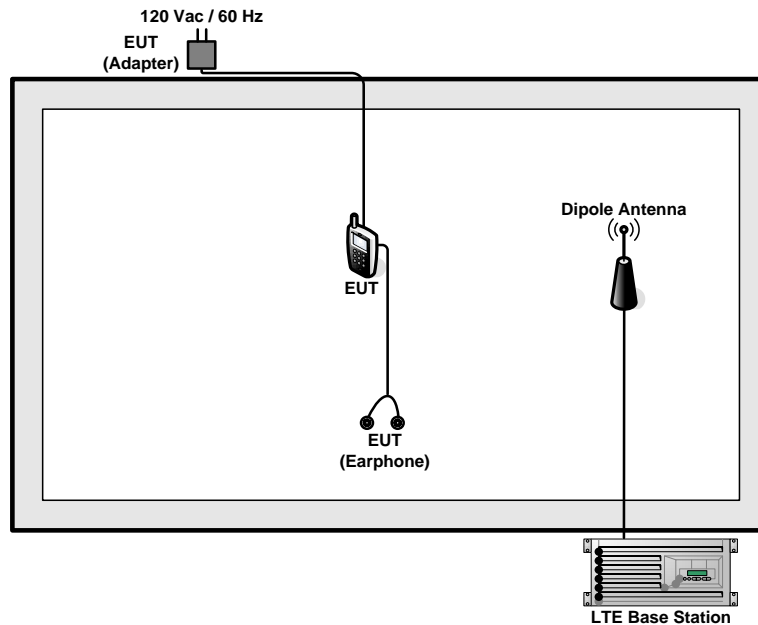
### 2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v02r02 with maximum output power.

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission.

Test Items	Band	Bandwidth (MHz)						Modulation		RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	L	M	H
Max. Output Power	4	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	7	-	-	√	√	√	√	√	√	√	√	√	√	√	√
Peak-to-Average Ratio	4						√	√	√	√		√	√	√	√
	7	-	-				√	√	√	√		√	√	√	√
26dB and 99% Bandwidth	4	√	√	√	√	√	√	√	√			√	√	√	√
	7	-	-	√	√	√	√	√	√			√	√	√	√
Conducted Band Edge	4	√	√	√	√	√	√	√	√	√		√	√		√
	7	-	-	√	√	√	√	√	√	√		√	√		√
Conducted Spurious Emission	4	√	√	√	√	√	√	√	√	√			√	√	√
	7	-	-	√	√	√	√	√	√	√			√	√	√
Frequency Stability	4				√			√				√		√	
	7	-	-		√			√				√		√	
E.R.P./ E.I.R.P.	4	√	√	√	√	√	√	√	√	√			√	√	√
	7	-	-	√	√	√	√	√	√	√			√	√	√
Radiated Spurious Emission	4	√	√	√	√	√	√	√		√			√	√	√
	7	-	-	√	√	√	√	√		√			√	√	√
Note	<ol style="list-style-type: none"> <li>The mark “√” means that this configuration is chosen for testing</li> <li>The mark “-” means that this bandwidth is not supported.</li> <li>The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.</li> </ol>														

## 2.2 Connection Diagram of Test System



## 2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	LTE Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m

## 2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

*Offset = RF cable loss + attenuator factor.*

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

Example :

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\ &= 4.2 + 10 = 14.2 \text{ (dB)} \end{aligned}$$

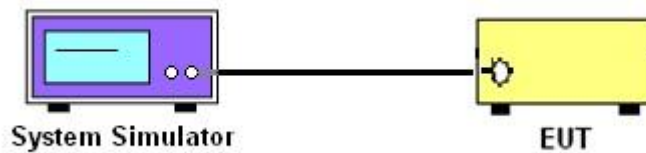
### 3 Conducted Test Items

#### 3.1 Measuring Instruments

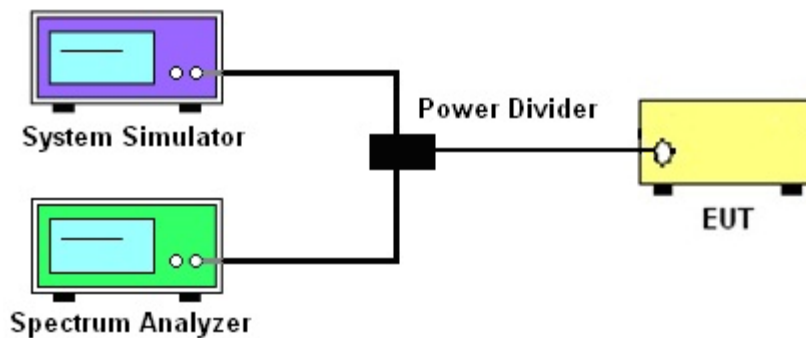
See list of measuring instruments of this test report.

#### 3.2 Test Setup

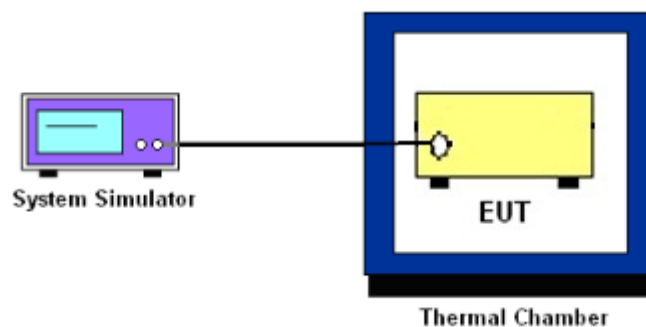
##### 3.2.1 Conducted Output Power



##### 3.2.2 Peak-to-Average Ratio, Occupied Bandwidth ,Conducted Band-Edge and Conducted Spurious Emission



##### 3.2.3 Frequency Stability



### 3.3 Test Result of Conducted Test

Please refer to Appendix A.



## **3.4 Conducted Output Power**

### **3.4.1 Description of the Conducted Output Power Measurement**

A system simulator was used to establish communication with the EUT. Its parameters were set to force the EUT transmitting at maximum output power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

### **3.4.2 Test Procedures**

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through the system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the system simulator.



## **3.5 Peak-to-Average Ratio**

### **3.5.1 Description of the PAR Measurement**

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

### **3.5.2 Test Procedures**

1. The testing follows FCC KDB 971168 v02r02 Section 5.7.1.
2. The EUT was connected to spectrum and system simulator via a power divider.
3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
4. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
5. Record the deviation as Peak to Average Ratio.