



# FCC RF Test Report

APPLICANT : Motorola Mobility LLC  
EQUIPMENT : Mobile Phone  
BRAND NAME : Motorola  
MODEL NAME : XT2155-5  
FCC ID : IHDT56ZW4  
STANDARD : 47 CFR Part 2, 22(H), 24(E), 27(L)  
CLASSIFICATION : PCS Licensed Transmitter Held to Ear (PCE)  
TEST DATE(S) : Aug. 30, 2021

We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26-2015 and shown 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 (Kunshan) Inc., the test report shall not be reproduced except in full.

Jason Jia

Reviewed by: Jason Jia / Supervisor

Alex Wang

Approved by: Alex Wang / Manager



**Sporton International (Kunshan) Inc.**

No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300  
People's Republic of China



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## REVISION HISTORY

| REPORT NO.   | VERSION | DESCRIPTION             | ISSUED DATE   |
|--------------|---------|-------------------------|---------------|
| FG142611-06A | Rev. 01 | Initial issue of report | Aug. 31, 2021 |
|              |         |                         |               |
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|              |         |                         |               |



## SUMMARY OF TEST RESULT

| Report Section | FCC Rule                                      | Description                          | Limit                                  | Result | Remark                                        |
|----------------|-----------------------------------------------|--------------------------------------|----------------------------------------|--------|-----------------------------------------------|
| 3.4            | §2.1053; §22.917(a);<br>§24.238(a); §27.53(h) | Field Strength of Spurious Radiation | $< 43 + 10 \log_{10}(P[\text{Watts}])$ | PASS   | Under limit<br>41.15 dB at<br>7524.000<br>MHz |

**Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

**Comments and Explanations:**

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.



# 1 General Description

## 1.1 Applicant

Motorola Mobility LLC

222 W, Merchandise Mart Plaza, Chicago, IL 60654 USA

## 1.2 Manufacturer

Motorola Mobility LLC

222 W, Merchandise Mart Plaza, Chicago, IL 60654 USA

## 1.3 Product Feature of Equipment Under Test

| Product Feature                 |                                                                                               |
|---------------------------------|-----------------------------------------------------------------------------------------------|
| Equipment                       | Mobile Phone                                                                                  |
| Brand Name                      | Motorola                                                                                      |
| Model Name                      | XT2155-5                                                                                      |
| FCC ID                          | IHDT56ZW4                                                                                     |
| EUT supports Radios application | GSM/WCDMA/LTE<br>WLAN 2.4GHz 802.11b/g/n HT20<br>Bluetooth BR/EDR/LE<br>FM Receiver, and GNSS |
| IMEI Code                       | Radiation: 355689860003061                                                                    |
| HW Version                      | DVT2                                                                                          |
| SW Version                      | RON31.164                                                                                     |
| EUT Stage                       | Identical Prototype                                                                           |

### Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. This is a variant report for XT2155-5. The change note could be referred to the XT2155-5\_Class II Permissive Change letter which is exhibit separately. Based on the similarity between current and previous project, only the related test cases from original test report (Sporton Report Number FG142611A) were verified for the differences.

## 1.4 Product Specification of Equipment Under Test

| Standards-related Product Specification |                                                                                                                                                                                            |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Tx Frequency</b>                     | <b>GSM/GPRS/EDGE:</b><br>850: 824 MHz ~ 849 MHz<br>1900: 1850MHz ~ 1910MHz<br><b>WCDMA:</b><br>Band V: 824 MHz ~ 849 MHz<br>Band II: 1850 MHz ~ 1910 MHz<br>Band IV: 1710 MHz ~ 1755 MHz   |
| <b>Rx Frequency</b>                     | <b>GSM/GPRS/EDGE:</b><br>850: 869 MHz ~ 894 MHz<br>1900: 1930 MHz ~ 1990 MHz<br><b>WCDMA:</b><br>Band V: 869 MHz ~ 894 MHz<br>Band II: 1930 MHz ~ 1990 MHz<br>Band IV: 2110 MHz ~ 2155 MHz |
| <b>Antenna Type</b>                     | Fixed Internal Antenna                                                                                                                                                                     |
| <b>Antenna Gain</b>                     | Cellular Band: -4.60 dBi<br>PCS Band: -2.70 dBi<br>AWS Band: -2.10 dBi                                                                                                                     |
| <b>Type of Modulation</b>               | GSM: GMSK<br>GPRS: GMSK<br>EDGE: GMSK / 8PSK<br>WCDMA : BPSK (Uplink)<br>HSDPA/DC-HSDPA : QPSK (Uplink)<br>HSUPA : QPSK (Uplink)<br>HSPA+ : 16QAM<br>DC-HSDPA : 64QAM                      |

## 1.5 Modification of EUT

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



## 1.6 Specification of Accessory

| Specification of Accessory |            |                       |            |                 |
|----------------------------|------------|-----------------------|------------|-----------------|
| AC Adapter 1(US)           | Brand Name | Motorola (Chenyang)   | Model Name | MC-101          |
| AC Adapter 1(EU)           | Brand Name | Motorola (Chenyang)   | Model Name | MC-102          |
| AC Adapter 1(UK)           | Brand Name | Motorola (Chenyang)   | Model Name | MC-103          |
| AC Adapter 1(AU)           | Brand Name | Motorola (Chenyang)   | Model Name | MC-105          |
| AC Adapter 1(AR)           | Brand Name | Motorola (Chenyang)   | Model Name | MC-106          |
| AC Adapter 2(Chile)        | Brand Name | Motorola (Salcomp)    | Model Name | MC-109          |
| AC Adapter 3(US)           | Brand Name | Motorola (Aohai)      | Model Name | MC-101          |
| AC Adapter 3(EU)           | Brand Name | Motorola (Aohai)      | Model Name | MC-102          |
| AC Adapter 3(UK)           | Brand Name | Motorola (Aohai)      | Model Name | MC-103          |
| AC Adapter 3(AU)           | Brand Name | Motorola (Aohai)      | Model Name | MC-105          |
| AC Adapter 3(AR)           | Brand Name | Motorola (Aohai)      | Model Name | MC-106          |
| Battery                    | Brand Name | Motorola (ATL)        | Model Name | NT40            |
| Earphone 1                 | Brand Name | Motorola (NEW LEADER) | Model Name | NLD-EM313A-23SF |
| Earphone 2                 | Brand Name | Motorola (Ju wei)     | Model Name | JWEP1185-ZN01H  |
| USB Cable 1                | Brand Name | Motorola (Ju wei)     | Model Name | JWUB1485-ZN01H  |
| USB Cable 2                | Brand Name | Motorola (Washin)     | Model Name | HX-ZN-13        |
| USB Cable 3                | Brand Name | Motorola (Ju wei)     | Model Name | JWUB1498-ZN01H  |

## 1.7 Testing Location

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

|                    |                                                                                                                                                                          |                     |                                |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------------------|
| Test Firm          | Sporton International (Kunshan) Inc.                                                                                                                                     |                     |                                |
| Test Site Location | No. 1098, Pengxi North Road, Kunshan Economic Development Zone<br>Jiangsu Province 215300 People's Republic of China<br>TEL : +86-512-57900158<br>FAX : +86-512-57900958 |                     |                                |
| Test Site No.      | Sporton Site No.                                                                                                                                                         | FCC Designation No. | FCC Test Firm Registration No. |
|                    | 03CH04-KS                                                                                                                                                                | CN1257              | 314309                         |

## 1.8 Test Software

| Item | Site      | Manufacturer | Name | Version      |
|------|-----------|--------------|------|--------------|
| 1.   | 03CH04-KS | AUDIX        | E3   | 6.2009-8-24a |

## 1.9 Applicable Standards

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

- 47 CFR Part 2, 22(H), 24(E), 27(L)
- ANSI C63.26-2015
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01

### 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 were performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

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

Radiated emissions were investigated as following frequency range:

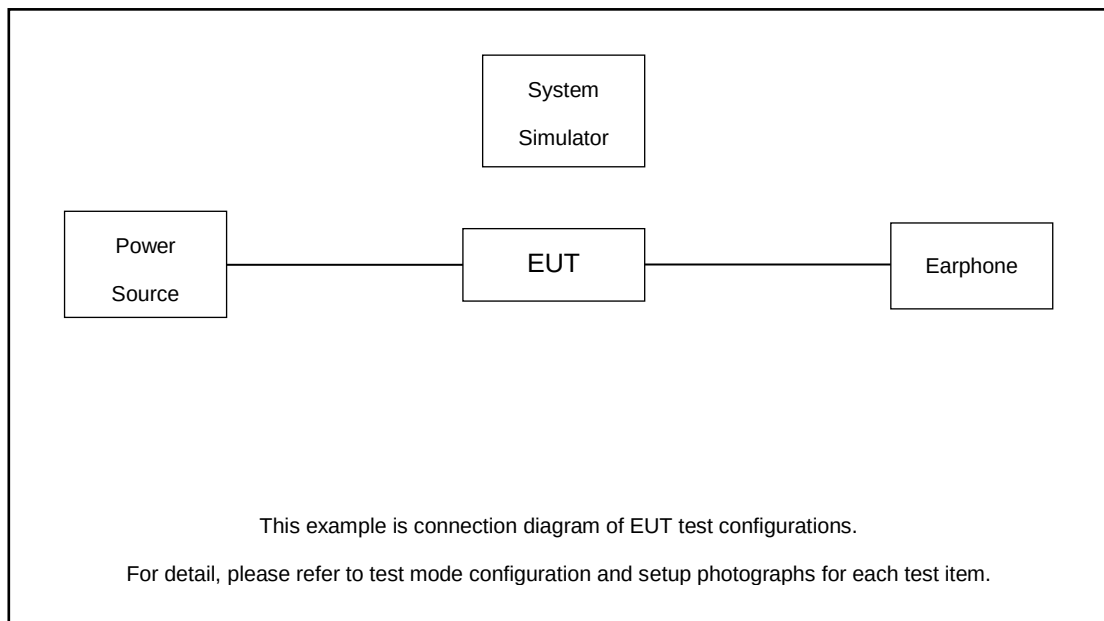
1. 30 MHz to 10th harmonic for WCDMA Band II.

All modes and data rates and positions were investigated.

Test modes are chosen to be reported as the worst case configuration below:

| Test Modes    |                     |
|---------------|---------------------|
| Band          | Radiated TCs        |
| WCDMA Band II | ■ RMC 12.2Kbps Link |

## 2.2 Connection Diagram of Test System



## 2.3 Support Unit used in test configuration

| Item | Equipment        | Trade Name | Model No. | FCC ID | Data Cable | Power Cord        |
|------|------------------|------------|-----------|--------|------------|-------------------|
| 1.   | System Simulator | R&S        | CMU 200   | N/A    | N/A        | Unshielded, 1.8 m |

## 2.4 Frequency List of Low/Middle/High Channels

| Frequency List   |                        |        |        |         |
|------------------|------------------------|--------|--------|---------|
| Band             | Channel/Frequency(MHz) | Lowest | Middle | Highest |
| WCDMA<br>Band II | Channel                | 9262   | 9400   | 9538    |
|                  | Frequency              | 1852.4 | 1880.0 | 1907.6  |

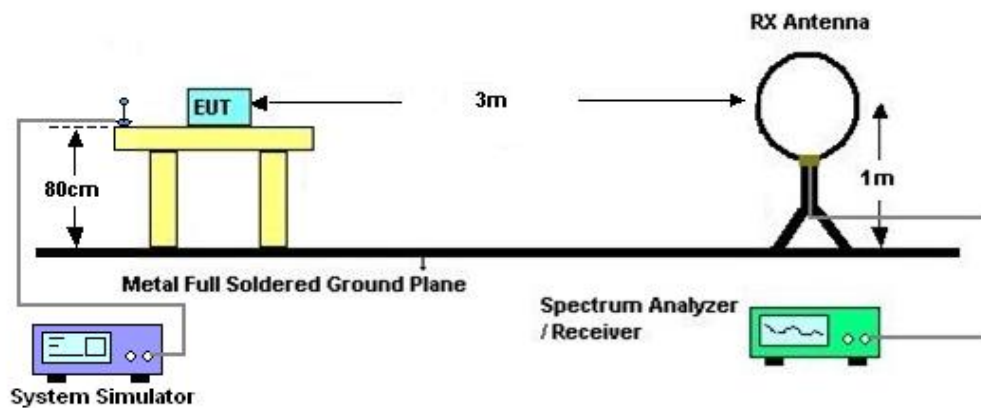
### 3 Radiated Test Items

#### 3.1 Measuring Instruments

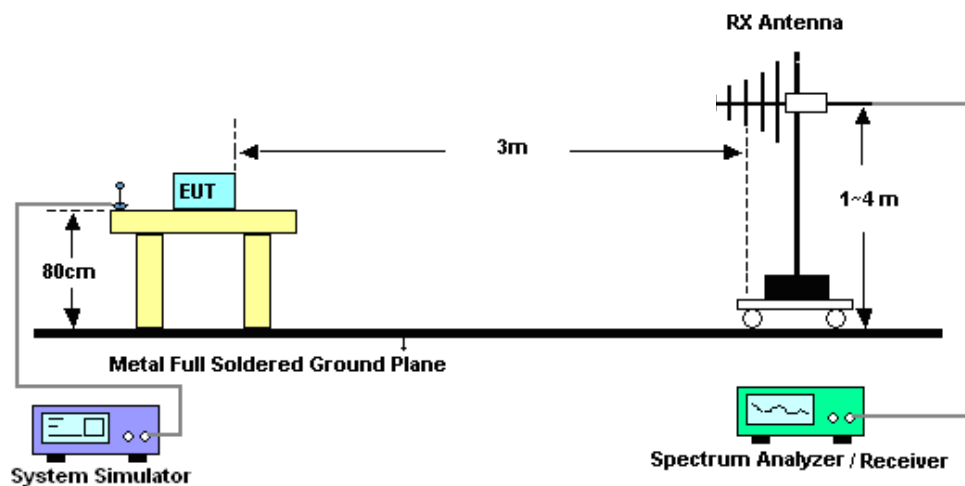
See list of measuring instruments of this test report.

#### 3.2 Test Setup

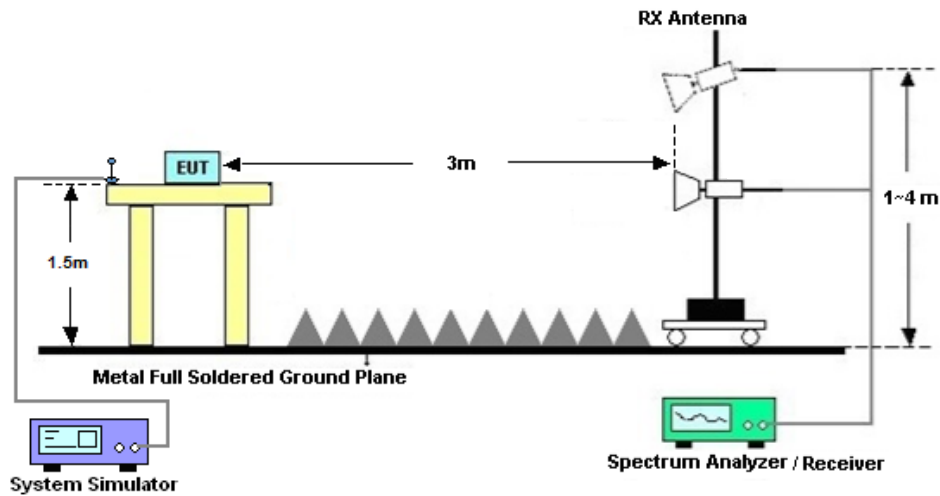
##### 3.2.1 For radiated test below 30MHz



##### 3.2.2 For radiated test from 30MHz to 1GHz



### 3.2.3 For radiated test above 1GHz



### 3.3 Test Result of Radiated Test

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

Please refer to Appendix A.



### **3.4 Field Strength of Spurious Radiation Measurement**

#### **3.4.1 Description of Field Strength of Spurious Radiated Measurement**

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

#### **3.4.2 Test Procedures**

1. The testing follows ANSI C63.26 Section 5.5
2. The EUT was placed on a rotatable wooden table 0.8 meters for frequency below 1GHz and 1.5 meter for frequency above 1GHz above the ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
9. Taking the record of output power at antenna port.
10. Repeat step 7 to step 8 for another polarization.
11.  $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
12.  $ERP \text{ (dBm)} = EIRP - 2.15$
13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
14. The limit line is derived from  $43 + 10\log(P)$  dB below the transmitter power P(Watts)



## 4 List of Measuring Equipment

| Instrument                | Manufacturer | Model No.               | Serial No. | Characteristics   | Calibration Date | Test Date     | Due Date      | Remark                |
|---------------------------|--------------|-------------------------|------------|-------------------|------------------|---------------|---------------|-----------------------|
| EXA Spectrum Analyzer     | Keysight     | N9010A                  | MY55150244 | 10Hz-44G,MAX 30dB | Apr. 13, 2021    | Aug. 30, 2021 | Apr. 12, 2022 | Radiation (03CH04-KS) |
| Bilog Antenna             | TeseQ        | CBL6111D                | 49922      | 30MHz-1GHz        | May. 30, 2021    | Aug. 30, 2021 | May. 29, 2022 | Radiation (03CH04-KS) |
| Double Ridge Horn Antenna | ETS-Lindgren | 3117                    | 75957      | 1GHz~18GHz        | Nov. 01, 2020    | Aug. 30, 2021 | Oct. 31, 2021 | Radiation (03CH04-KS) |
| SHF-EHF Horn              | Com-power    | AH-840                  | 101115     | 18GHz~40GHz       | Jan. 06, 2021    | Aug. 30, 2021 | Jan. 05, 2022 | Radiation (03CH04-KS) |
| Amplifier                 | SONOMA       | 310N                    | 187289     | 9KHz-1GHz         | Jan. 06, 2021    | Aug. 30, 2021 | Jan. 05, 2022 | Radiation (03CH04-KS) |
| Amplifier                 | MITEQ        | EM18G40G GA             | 060728     | 18~40GHz          | Jan. 07, 2021    | Aug. 30, 2021 | Jan. 06, 2022 | Radiation (03CH04-KS) |
| high gain Amplifier       | MITEQ        | AMF-7D-00 101800-30-10P | 2025788    | 1Ghz-18Ghz        | Jan. 06, 2021    | Aug. 30, 2021 | Jan. 05, 2022 | Radiation (03CH04-KS) |
| Amplifier                 | Keysight     | 83017A                  | MY57280106 | 500MHz~26.5GHz    | Oct. 14, 2020    | Aug. 30, 2021 | Oct. 13, 2021 | Radiation (03CH04-KS) |
| AC Power Source           | Chroma       | 61601                   | F104090004 | N/A               | NCR              | Aug. 30, 2021 | NCR           | Radiation (03CH04-KS) |
| Turn Table                | ChamPro      | EM 1000-T               | 060762-T   | 0~360 degree      | NCR              | Aug. 30, 2021 | NCR           | Radiation (03CH04-KS) |
| Antenna Mast              | ChamPro      | EM 1000-A               | 060762-A   | 1 m~4 m           | NCR              | Aug. 30, 2021 | NCR           | Radiation (03CH04-KS) |

NCR: No Calibration Required



## 5 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.26-2015. All the measurement uncertainty value were shown with a coverage  $K=2$  to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

|                                                                         |       |
|-------------------------------------------------------------------------|-------|
| Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ ) | 3.3dB |
|-------------------------------------------------------------------------|-------|

### Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

|                                                                         |       |
|-------------------------------------------------------------------------|-------|
| Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ ) | 2.8dB |
|-------------------------------------------------------------------------|-------|



## Appendix A. Test Results of Radiated Test

### Radiated Spurious Emission

| WCDMA Band II(RMC 12.2Kbps) |                      |                 |                  |                         |                          |                            |                             |                       |
|-----------------------------|----------------------|-----------------|------------------|-------------------------|--------------------------|----------------------------|-----------------------------|-----------------------|
| Channel                     | Frequency<br>( MHz ) | EIRP<br>( dBm ) | Limit<br>( dBm ) | Over<br>Limit<br>( dB ) | S.G.<br>Power<br>( dBm ) | TX Cable<br>loss<br>( dB ) | TX Antenna<br>Gain<br>(dBi) | Polarization<br>(H/V) |
| Middle                      | 3759                 | -57.81          | -13              | -44.81                  | -70.07                   | 2.64                       | 14.90                       | H                     |
|                             | 5640                 | -56.59          | -13              | -43.59                  | -68.45                   | 2.94                       | 14.80                       | H                     |
|                             | 7524                 | -54.16          | -13              | -41.16                  | -63.93                   | 3.39                       | 13.16                       | H                     |
|                             | 3759                 | -57.51          | -13              | -44.51                  | -69.77                   | 2.64                       | 14.90                       | V                     |
|                             | 5640                 | -56.79          | -13              | -43.79                  | -68.65                   | 2.94                       | 14.80                       | V                     |
|                             | 7524                 | -54.15          | -13              | -41.15                  | -63.92                   | 3.39                       | 13.16                       | V                     |

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.