



# FCC RF Test Report

**Product Name: LTE Multi-mode USB Stick**

**Model Number: E392u-511**

**Report No: SYBH(Z-RF)009122011-2002**

**FCC ID: QISE392U-511**

**Reliability Laboratory of Huawei Technologies Co., Ltd.**

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## Notice

1. The laboratory has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), and accreditation number: L0310.
2. The laboratory has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements. The site recognition number is 97456.
3. The laboratory has been listed by industry Canada to perform electromagnetic emission measurement. The site recognition number is 6369A-2.
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8. Normally, the test report is only responsible for the samples that have undergone the test.
9. Context of the test report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of the laboratory.



**Applicant:** Huawei Technologies Co., Ltd.  
**Address:** Huawei Base, Bantian, Longgang District, Shenzhen  
518129, P.R. China  
**Date of Receipt Test Item:** Dec.21, 2011  
**Start Date of Test:** Dec.22, 2011  
**End Date of Test:** Dec.26, 2011  
  
**Test Result:** Pass

|             |                             |                               |                                                                                                           |
|-------------|-----------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------|
| Approved By | <u>Dec.28, 2011</u><br>Date | <u>Dai Linjun</u><br>Name     | <u></u><br>Signature |
| Reviewed By | <u>Dec.28, 2011</u><br>Date | <u>Cousy Xu</u><br>Name       | <u></u><br>Signature |
| Operator    | <u>Dec.28, 2011</u><br>Date | <u>Huang Qiuliang</u><br>Name | <u></u><br>Signature |

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# 1 General Information

## 1.1 Applied Standard

Applied Rules: 47 CFR FCC Part 2, Subpart J  
47 CFR FCC Part 24, Subpart E

## 1.2 Test Location

Test Location 1: Reliability Laboratory of Huawei Technologies Co., Ltd.  
Address: Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China

## 1.3 Test Environment Condition

Ambient Temperature: 20 – 25 °C  
Ambient Relative Humidity: 45 – 55 %  
Atmospheric Pressure: 101 kPa

## 2 Test Summary

Table 1 Summary of results

| PCS Band                               |                 |                                                                                                                                               |        |
|----------------------------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Test Case                              | FCC Part No.    | Requirements                                                                                                                                  | Result |
| Transmitter Output Power               | 2.1046 & 24.232 | Peak EIRP not exceed 2 W                                                                                                                      | Pass   |
| Modulation Characteristics             | 2.1047          | Digital modulation                                                                                                                            | Pass   |
| Occupied Bandwidth                     | 2.1049          | (Not specified)                                                                                                                               | Pass   |
| Band Edges Compliance                  | 2.1051 & 24.238 | Below -13 dBm/1%*EBW, in 1 MHz range                                                                                                          | Pass   |
| Spurious Emission at Antenna Terminals | 2.1051 & 24.238 | Below -13 dBm/1 kHz, 9 kHz to 150 kHz<br>Below -13 dBm/10 kHz, 150 kHz to 30 MHz<br>Below -13 dBm/1 MHz, 30 MHz to 10 <sup>th</sup> harmonics | Pass   |
| Radiated Spurious Emissions            | 2.1053 & 24.238 | Below -13 dBm/1 MHz                                                                                                                           | Pass   |
| Frequency Stability                    | 2.1055 & 24.235 | Stay within the authorized frequency block                                                                                                    | Pass   |

## 3 Product Description

### 3.1 Production Information

#### 3.1.1 General Description

E392u-511 LTE Multi-mode USB Stick is subscriber equipment in the LTE/DC-HSPA+/HSPA+/UMTS/EDGE/GPRS/GSM system. E392u-511 implements such functions as RF signal receiving/transmitting, LTE/DC-HSPA+/HSPA+/WCDMA and EDGE/GPRS/GSM protocol processing, data service etc. Externally it provides USB interface (to connect to the notebook etc.), USIM card interface and Micro SD card interface.

#### 3.1.2 Board

Table 2 Board Information

| LTE Multi-mode USB Stick |                  |
|--------------------------|------------------|
| E392u-511                |                  |
| Board and Module         |                  |
| Software Version         | Hardware Version |
| 11.335.31.01.000         | CD1E392M         |

## 3.2 Test Description

### 3.2.1 Supported Frequency Range

| Characteristics | Description      |
|-----------------|------------------|
| Downlink        | 1930 to 1990 MHz |
| Uplink          | 1850 to 1910MHz  |

### 3.2.2 Transmitter / Receiver Characteristics

| Characteristics                    | Description                                                                                 |
|------------------------------------|---------------------------------------------------------------------------------------------|
| System Type                        | GSM<br>UMTS                                                                                 |
| TX Output Power (per Antenna Port) | GSM system: 30dBm<br>UMTS system: 24dBm                                                     |
| Channel Spacing(s) / Bandwidth(s)  | GSM system: 200 kHz<br>UMTS system: 5 MHz                                                   |
| Designation of Emissions           | GSM system: 250KGXW (GMSK modulation),<br>242KG7W (8PSK modulation)<br>UMTS system: 4M15F9W |

### 3.2.3 Antenna Gain

|                    |      |
|--------------------|------|
| Antenna Gain(dBi): | 3.0  |
| Antenna Gain(dBd): | 0.85 |

### 3.2.4 Power Supply

|                             | Description                                                                |
|-----------------------------|----------------------------------------------------------------------------|
| Power Supply Type           | Directly Connected to DC /AC Power Supply                                  |
| Input to Adapter (DC power) | DC Voltage Nominal: $\pm$ +5V<br>DC Voltage Range: $\pm$ +4.75 V to +5.25V |

## 4 General Test Conditions / Configurations

### 4.1 RF Channels under Test

| Test Mode   | TX / RX | RF Channel   |              |              |
|-------------|---------|--------------|--------------|--------------|
|             |         | Bottom (B)   | Middle (M)   | Top (T)      |
| TM1/TM2     | TX      | Channel 512  | Channel 661  | Channel 810  |
|             |         | 1850.2MHz    | 1880.0MHz    | 1909.8MHz    |
|             | RX      | Channel 512  | Channel 661  | Channel 810  |
|             |         | 1930.2 MHz   | 1960.0 MHz   | 1989.8 MHz   |
| TM3/TM4/TM5 | TX      | Channel 9262 | Channel 9400 | Channel 9538 |
|             |         | 1852.4MHz    | 1880.0MHz    | 1907.6MHz    |
|             | RX      | Channel 9662 | Channel 9800 | Channel 9938 |
|             |         | 1932.4 MHz   | 1960.0 MHz   | 1987.6 MHz   |

### 4.2 Test Modes

| Test Mode | Test Modes Description    |
|-----------|---------------------------|
| TM1       | GSM/GPRS, GMSK modulation |
| TM2       | EDGE, 8PSK modulation     |
| TM3       | WCDMA QPSK modulation     |
| TM4       | HSDPA 16QAM modulation    |
| TM5       | HSUPA 16QAM modulation    |

### 4.3 Test Environments

| Environment Parameter | Selected Values During Tests |         |
|-----------------------|------------------------------|---------|
| Relative Humidity     | Ambient                      |         |
| Temperature           | TN                           | Ambient |
| Voltage               | VL                           | 4.75V   |
|                       | VN                           | 5.0V    |
|                       | VH                           | 5.25V   |

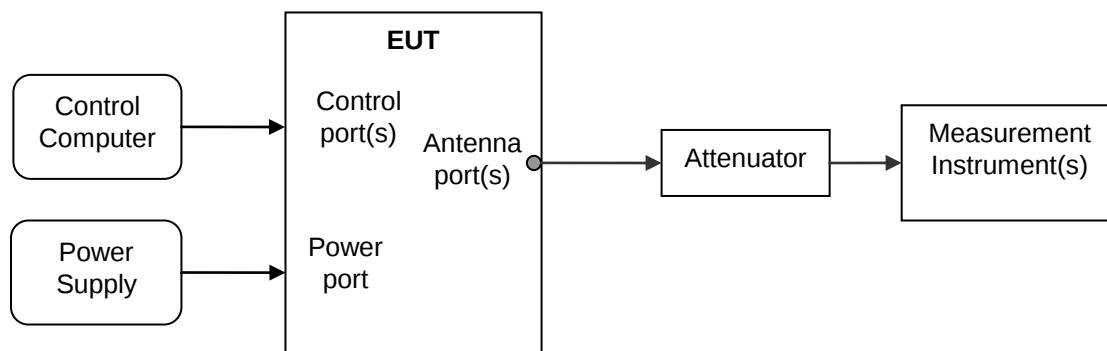
NOTE: VL= lower extreme test voltages  
VN= nominal voltage  
VH= upper extreme test voltage  
TN= nominal temperature

## 4.4 Test Setups

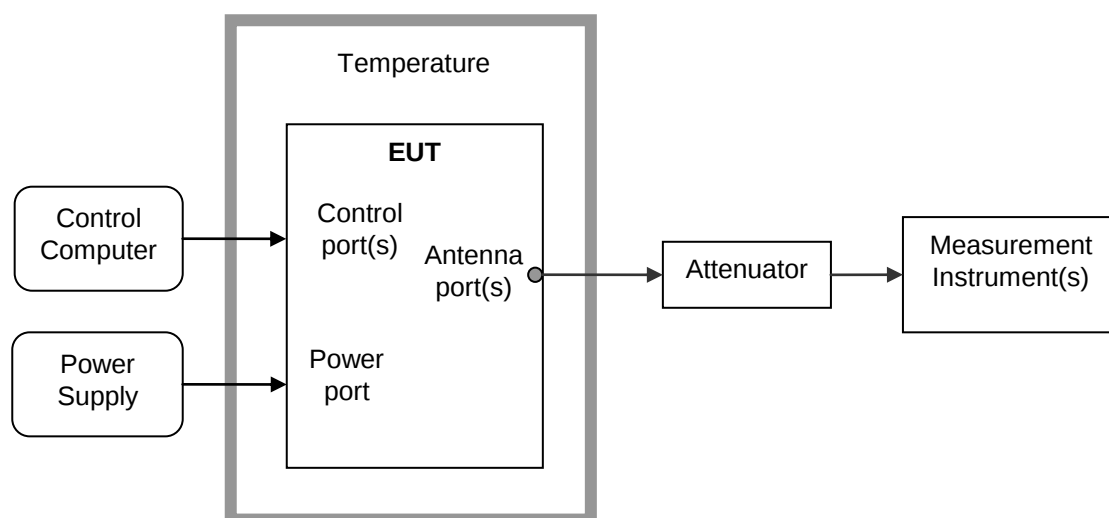
### 4.4.1 General Test Setup Configurations

| Configuration       | Description                                                                                                                                                                                                                                        |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Antenna Ports  | Until otherwise declared, all TX tests are ONLY performed at the main Transmitter antenna port (e.g. TRXA, TXA and so on) of the EUT, and all RX tests are ONLY performed at the main Receiver antenna port (e.g. TRXA, RXA and so on) of the EUT. |
| Multiple RF Sources | Other than the tested RF source of the EUT, other RF source(s) are disabled or shutdown during measurements.                                                                                                                                       |

### 4.4.2 Test Setup 1



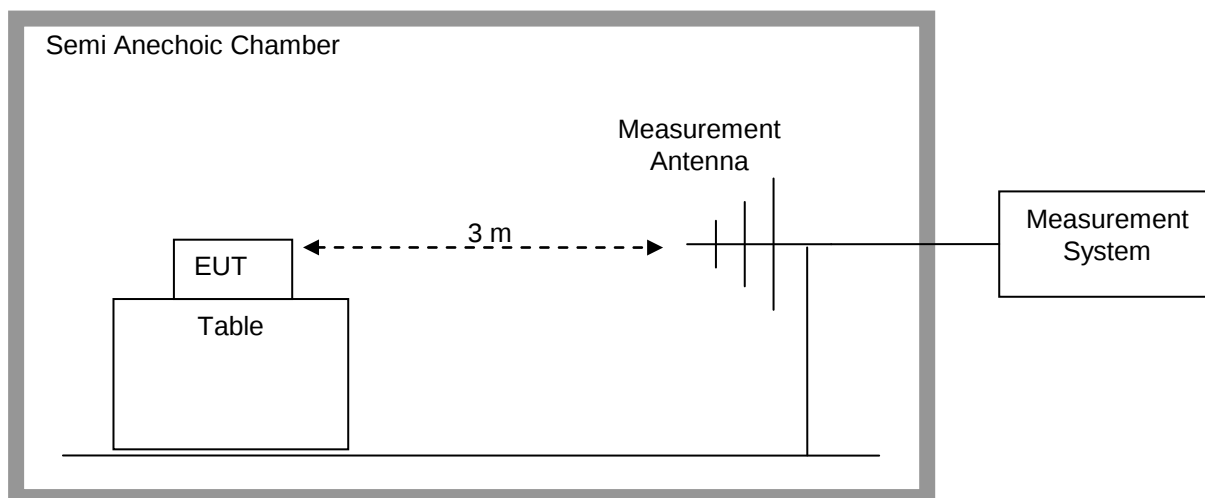
### 4.4.3 Test Setup 2



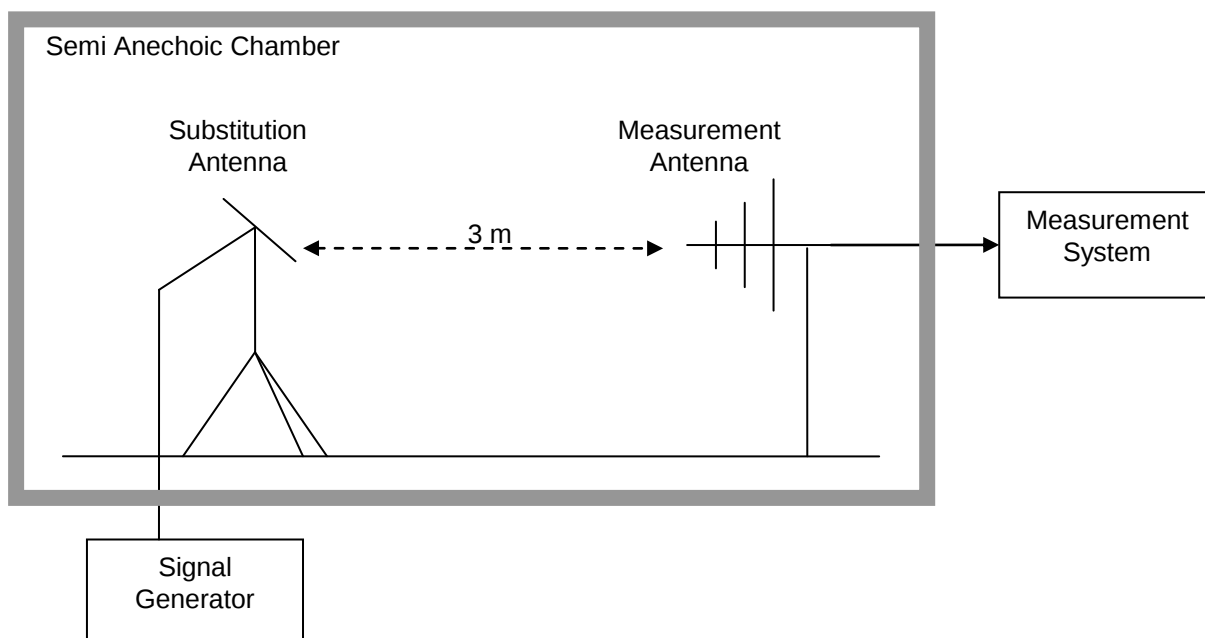
#### 4.4.4 Test Setup 3

NOTE: Effective Isotropic radiated power (EIRP) refers to the radiation power output of the EUT, assuming all emissions are radiated from half-wave dipole antennas.

##### Step 1: Pre-test



##### Step 2: Substitution method to verify the maximum EIRP



## 4.5 Test Conditions

| Test Case                              | Test Conditions    |                                                                                                                           |
|----------------------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------|
| Transmitter Output Power               | Test Configuration | Ambient Temperature & Rated Voltage                                                                                       |
|                                        | Test Setup         | Test Setup 1&Test Setup 3                                                                                                 |
|                                        | Detector           | RMS                                                                                                                       |
|                                        | RF Channels (TX)   | B, M, T                                                                                                                   |
|                                        | Test Mode          | TM1/TM2/TM3/TM4/TM5                                                                                                       |
| Modulation Characteristics             | Test Configuration | Ambient Temperature & Rated Voltage                                                                                       |
|                                        | Test Setup         | Test Setup 1                                                                                                              |
|                                        | RF Channels (TX)   | M                                                                                                                         |
|                                        | Test Mode          | TM1/TM2/TM3                                                                                                               |
| Occupied Bandwidth                     | Test Configuration | Ambient Temperature & Rated Voltage                                                                                       |
|                                        | Test Setup         | Test Setup 1                                                                                                              |
|                                        | Detector           | PK                                                                                                                        |
|                                        | RF Channels (TX)   | B, M, T                                                                                                                   |
|                                        | Test Mode          | TM1/TM2/TM3                                                                                                               |
| Band Edges Compliance                  | Test Configuration | Ambient Temperature & Rated Voltage                                                                                       |
|                                        | Test Setup         | Test Setup 1                                                                                                              |
|                                        | Detector           | RMS                                                                                                                       |
|                                        | RF Channels (TX)   | B, T                                                                                                                      |
|                                        | Test Mode          | TM1/TM2/TM3                                                                                                               |
| Spurious Emission at Antenna Terminals | Test Configuration | Ambient Temperature & Rated Voltage                                                                                       |
|                                        | Test Setup         | Test Setup 1                                                                                                              |
|                                        | Detector           | PK                                                                                                                        |
|                                        | RF Channels (TX)   | B, M,T                                                                                                                    |
|                                        | Test Mode          | TM1/TM2/TM3                                                                                                               |
| Radiated Spurious Emissions            | Test Configuration | Ambient Temperature & Rated Voltage                                                                                       |
|                                        | Test Setup         | Test Setup 3                                                                                                              |
|                                        | Detector           | PK                                                                                                                        |
|                                        | RF Channels (TX)   | M                                                                                                                         |
|                                        | Test Mode          | TM1/TM2/TM3/TM4/TM5                                                                                                       |
| Frequency Stability                    | Test Configuration | (1) -30 °C to +50 °C with step 10 °C at Rated Voltage;<br>(2) 85%, 100% and 115% of Rated Voltage at Ambient Temperature. |
|                                        | Test Setup         | Test Setup 2                                                                                                              |
|                                        | RF Channels (TX)   | M                                                                                                                         |



|           |                 |             |
|-----------|-----------------|-------------|
| Test Case | Test Conditions |             |
|           | Test Mode       | TM1/TM2/TM3 |

## 5 Main Test Instruments

Table 3 Main Test Equipments

| Equipment Description                | Manufacturer | Model                   | Serial Number | Calibrated until |
|--------------------------------------|--------------|-------------------------|---------------|------------------|
| Power supply                         | KEITHLEY     | 2303                    | 1288003       | Sep.27,2012      |
| Universal Radio Communication Tester | R&S          | CMU200                  | 117341        | Jan.13.2012      |
| Universal Radio Communication Tester | Agilent      | E5515C                  | MY50260239    | Aug.31,2012      |
| Spectrum Analyzer                    | Agilent      | E4440A                  | MY49420179    | Apr.20,2012      |
| Signal Analyzer                      | R&S          | FSQ31                   | 200021        | Sep.27,2012      |
| Temperature Chamber                  | WEISS        | WKL64                   | 24600294      | Jan.03,2012      |
| Signal generator                     | Agilent      | E8257D                  | MY49281095    | Jul.09.2012      |
| Test receiver                        | R&S          | ESU26                   | 100150        | May.29.2012      |
| Tunable Dipole                       | Schwarzbeck  | D69250-UHAP/D69250-VHAP | 919/1009      | Jan.29.2012      |
| Tunable Dipole                       | Schwarzbeck  | D69250-UHAP/D69250-VHAP | 979/917       | Jan.29.2012      |
| Horn Antenna                         | R & S        | HF906                   | 100683        | May.15, 2012     |
| Horn Antenna                         | R & S        | HF906                   | 100684        | Jul.01, 2012     |
| Broadband Antenna                    | Schwarzbeck  | VULB 9163               | 9163-357      | May.15, 2012     |
| Broadband Antenna                    | Schwarzbeck  | VULB 9163               | 9163-356      | May.15, 2012     |

## 6 Test Results

| No. | Test Item                              | Test Result |
|-----|----------------------------------------|-------------|
| 1   | Transmitter Output Power               | Appendix A  |
| 2   | Modulation Characteristics             | Appendix B  |
| 3   | Occupied Bandwidth                     | Appendix C  |
| 4   | Band Edges Compliance                  | Appendix D  |
| 5   | Spurious Emission at Antenna Terminals | Appendix E  |
| 6   | Radiated Spurious Emissions            | Appendix F  |
| 7   | Frequency Stability                    | Appendix G  |
| 8   | Photos of Radiated Spurious Emissions  | Appendix H  |

NOTE: The Appendix H only photos of Radiated Spurious Emissions, no test data.

## 7 Measurement Uncertainty

For a 95% confidence level ( $k=2$ ), the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

| Test Item                            |                          | Extended Uncertainty                               |
|--------------------------------------|--------------------------|----------------------------------------------------|
| Transmitter Output Power             | Power (dBm)              | U =0.39 dB                                         |
| Occupied Bandwidth                   | Magnitude (%)            | U=0.2%                                             |
| Band Edge Compliance                 | Disturbance Power (dBm)  | U=2.0 dB                                           |
| Conducted Spurious Emissions         | Disturbance Power (dBm)  | U=2.0 dB                                           |
| Field Strength of Spurious Radiation | ERP (dBm)                | U=4.6 dB (30 MHz – 1GHz)<br>U=3.0 dB (above 1 GHz) |
| Frequency Stability                  | Frequency Accuracy (ppm) | U=0.21 ppm                                         |