



FCC RF Test Report

Product Name: LTE 2D USB Rotator

Model Number: E397Bu-501R3

**Report No: SYBH(Z-RF)001052012-2001
FCC ID: QISE397BU-501R**

Reliability Laboratory of Huawei Technologies Co., Ltd.

Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China

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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.
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Applicant: Huawei Technologies Co., Ltd.
Address: Huawei Base, Bantian, Longgang District, Shenzhen
 518129, P.R. China
Date of Receipt Test Item: Apr.25, 2012
Start Date of Test: Apr.26, 2012
End Date of Test: May.02, 2012

Test Result: Pass

Approved By Senior Engineer May.03, 2012 Dai Linjun *Dai Linjun*
 Date Name Signature

Reviewed By May.03, 2012 Cousy Xu *Cousy XU*
 Date Name Signature

Operator May.03, 2012 Huang Qiuliang *Huang Qiuliang*
 Date Name Signature



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1 General Information

1.1 Applied Standard	
Applied Rules:	47 CFR FCC Part 2:2010, Subpart J 47 CFR FCC Part 27:2010, Subpart C&L ANSI/TIA 603C:2004
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 Summary

Table 1 Summary of results

Test Case	FCC Part No.	Requirements	Result
AWS Band			
Transmitter Output Power	2.1046 & 27.50(d)	Peak EIRP not exceed 1 W	Pass
Modulation Characteristics	2.1047	Digital modulation	Pass
Occupied Bandwidth	2.1049	(Not specified)	Pass
Band Edges Compliance	2.1051 & 27.53(h)	Below -13 dBm/1%*EBW, in 1 MHz range	Pass
Spurious Emission at Antenna Terminals	2.1051 & 27.53(h)	Below -13 dBm/1 kHz, 9 kHz to 150 kHz Below -13 dBm/10 kHz, 150 kHz to 30 MHz Below -13 dBm/1 MHz, 30 MHz to 10 th harmonics	Pass
Field Strength of Spurious Radiation	2.1053 & 27.53(h)	Below -13 dBm/1 MHz	Pass
Frequency Stability	2.1055 & 27.54	Stay within the authorized bands of operation	Pass

3 Product Description

3.1 Production Information

3.1.1 General Description

E397Bu-501R3 LTE/HSPA+/WCDMA/EDGE/GPRS/GSM dual mode 10 bands 2D USB Rotator is subscriber equipment in the LTE/UMTS/GSM system. E397Bu-501R3 implement such functions as RF signal receiving/transmitting LTE, DC-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.

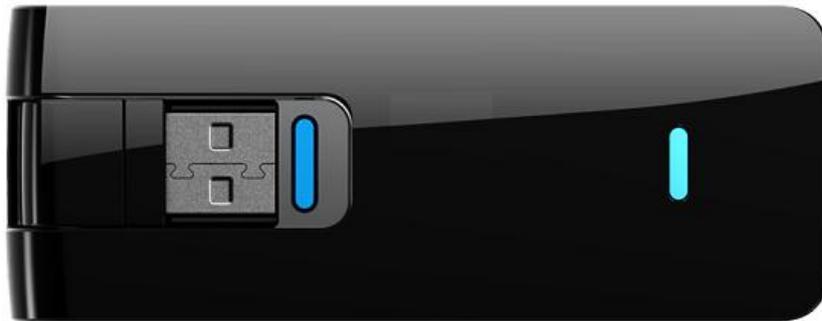
The difference of E397Bu-501 and E397Bu-501R3:

E397Bu-501 is a GSM/GPRS/EDGE/WCDMA/LTE 2D USB Rotator which supports GSM four bands, WCDMA band 1/2/5, LTE Band 4/17.

- 1) E397Bu-501R3 adds the WCDMA band 4 through software based on Old E397Bu-501. The PCB is the same. It doesn't affect the other bands performance.
- 2) E397Bu-501R3 increase the out power for WCDMA band 2 through NV. The followed table is show the different between the 2 Modules.

	E397Bu-501 (old)	E397Bu-501R3 (new)
LTE AWS BAND	support	support
LTE BAND17	support	support
WCDMA B1	support	support
WCDMA PCS	Support 22dBm [+/- 1dB]	Support Low channel:22.6dBm [+/- 1dB] Mid channel:22.6dBm [+/- 1dB] High channel:23.5dBm [+/- 1dB]
WCDMA AWS	NO	support
WCDMA B5	support	support
GSM 850/900/1800/1900	support	support
FLASH	the same	the same
PCB	the same	the same
Appearance	Common Appearance	Common Appearance

the PCB appearance is no distinctness difference .
The photo of the USB Stick:



So E397Bu-501R3 test data refer to No. SYBH(Z-RF)006112011 of E397Bu-501 test report except WCDMA PCS and AWS bands test data. Here only WCDMA AWS test data included in this report.

3.1.2 Board Information

Table 2 Board Information

LTE 2D USB Rotator		
E397Bu-501R3		
Board and Module		
Hardware Version	Software Version	Description
CD2E397UM	13.433.35.00.000	Main board

4 Test Description

4.1 Supported Frequency Range

Characteristics	Description
Uplink	1710 to 1755 MHz
Downlink	2110 to 2155 MHz

4.2 Transmitter / Receiver Characteristics

Characteristics	Description
System Type	UMTS
TX Output Power (per Antenna Port)	UMTS system: 24dBm;
Channel Spacing(s) / Bandwidth(s)	UMTS system: 5 MHz
Designation of Emissions	UMTS system: 4M15F9W

4.3 Antenna Gain

Antenna Gain(dBi)	3.36
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4.4 Power Supply

Specification	Description
Power Supply Type	Directly Connected to DC /AC Power Supply
Input to EUT (DC power)	DC Voltage Nominal: \equiv 5.0 V DC Voltage Range: \equiv 4.75 V to 5.25 V
Input to EUT (AC power)	AC Voltage Nominal: ~ 230 V (50/60 Hz) AC Voltage Range: ~100-240V

5 General Test Conditions / Configurations

5.1 RF Channels under Test

Test Mode	TX / RX	RF Channel		
		Bottom (B)	Middle (M)	Top (T)
TM1/TM2/TM3	TX	Channel1312(B)	Channel1412(M)	Channel1513(T)
		1712.4MHz	1732.4MHz	1752.6MHz
	RX	Channel 1537	Channel 1637	Channel 1738
		2112.4 MHz	2132.4 MHz	2152.6 MHz

5.2 Test Modes

Test Mode	Test Modes Description
TM1	WCDMA ,QPSK modulation
TM2	HSDPA , QPSK modulation
TM3	HSUPA , QPSK modulation

5.3 Test Environments

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

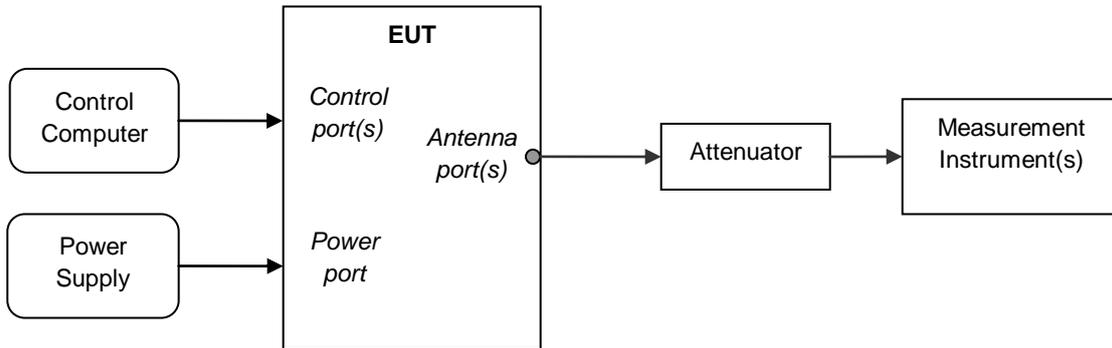
NOTE: VL= lower extreme test voltages
VN= nominal voltage
VH= upper extreme test voltage
TN= normal temperature

5.4 Test Setups

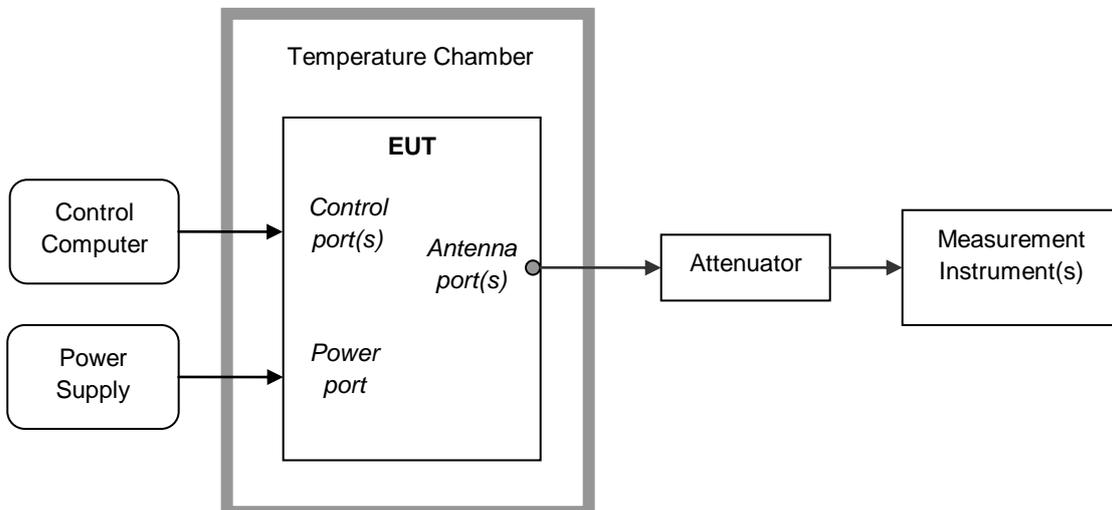
5.4.1 General Test Setup Configurations

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.

5.4.2 Test Setup 1



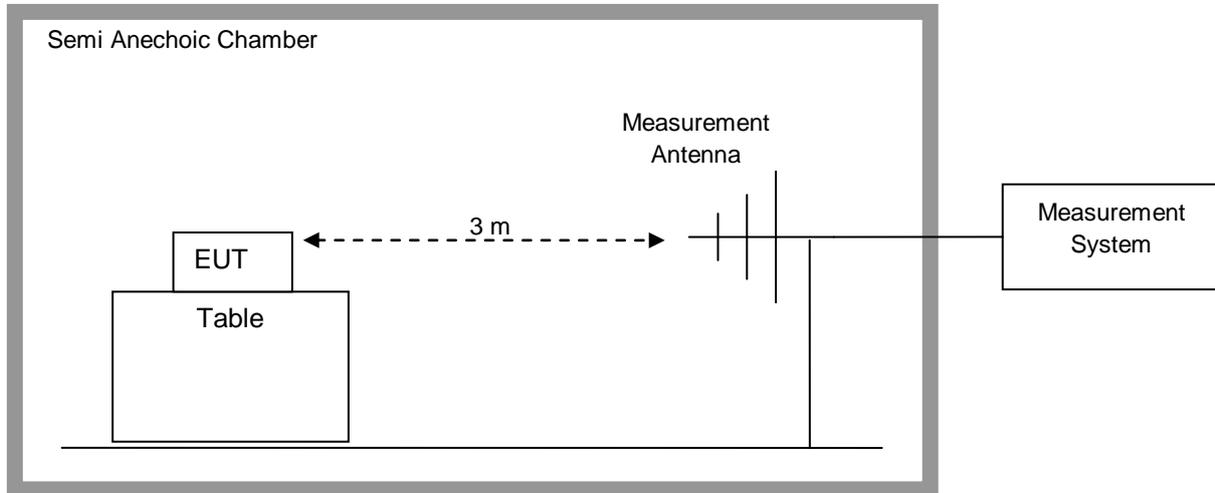
5.4.3 Test Setup 2



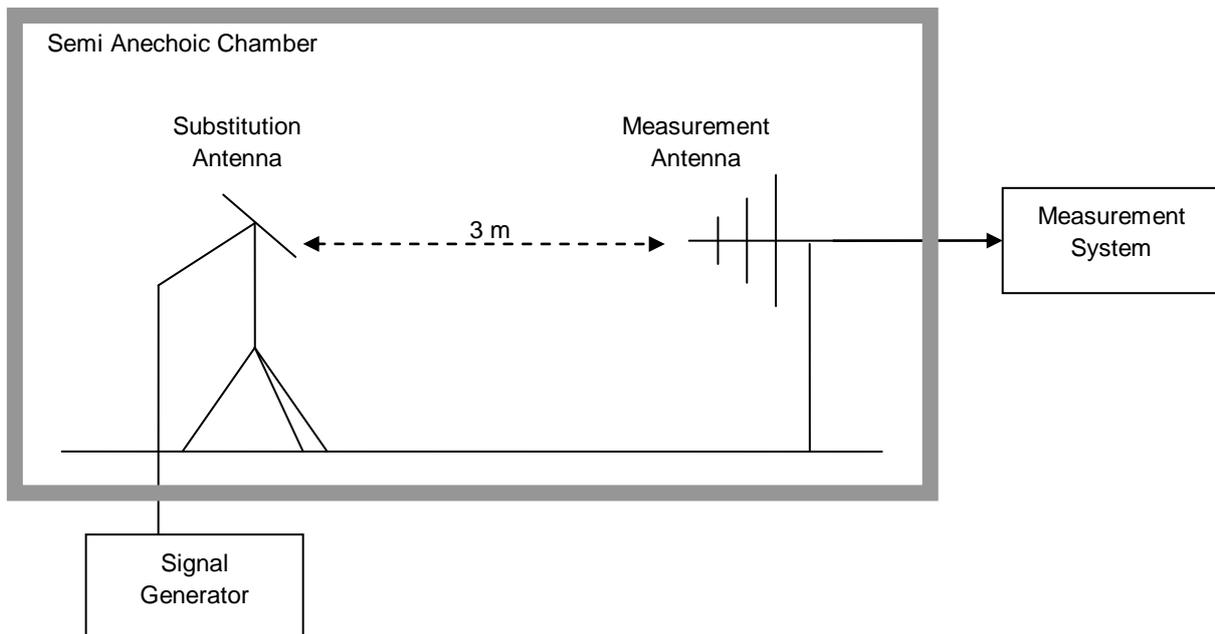
5.4.4 Test Setup 3

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



5.5 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
Modulation Characteristics	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	RF Channels (TX)	M
	Test Mode	TM1
Occupied Bandwidth	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	Detector	PK
	RF Channels (TX)	B, M, T
	Test Mode	TM1
Band Edges Compliance	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	Detector	RMS
	RF Channels (TX)	B, T
	Test Mode	TM1
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
Field Strength of Spurious Radiation	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 3
	Detector	PK
	RF Channels (TX)	M
	Test Mode	TM1/TM2/TM3
Frequency Stability	Test Configuration	(1) -30 °C to +50 °C with step 10 °C at Rated Voltage; (2) 85%, 100% and 115% of Rated Voltage at Ambient Temperature.



Test Case	Test Conditions	
	Test Setup	Test Setup 2
	RF Channels (TX)	M
	Test Mode	TM1

6 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.12.2013
Universal Radio Communication Tester	Agilent	E5515C	MY50260239	Aug.31,2012
Spectrum Analyzer	Agilent	E4440A	MY48250119	Jul.17,2012
Signal Analyzer	R&S	FSQ31	200021	Sep.27,2012
Temperature Chamber	WEISS	WKL64	24600294	Feb.13,2013
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.29.2013
Tunable Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	979/917	Jan.29.2013
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



7 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	Field Strength of Spurious Radiation	Appendix F
7	Frequency Stability	Appendix G
8	Photos of Field Strength of Spurious Radiation	Appendix H

NOTE: The Appendix H only photos of Field Strength of Spurious Radiation, no test data.

8 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) U=3.0 dB (above 1 GHz)
Frequency Stability	Frequency Accuracy (ppm)	U=0.21 ppm

-----The END-----