

SPECTRUM REPORT

Applicant: SHENZHEN WLINK TECHNOLOGY CO., LIMITED

Address of Applicant: 319,YiBen Electronic Business Building, NO.1063 ChaGuang Road, XiLi, NanShan District, ShenZhen, China

Manufacturer/ Factory: SHENZHEN WLINK TECHNOLOGY CO., LIMITED

Address of Manufacturer/ Factory: 319,YiBen Electronic Business Building, NO.1063 ChaGuang Road, XiLi, NanShan District, ShenZhen, China

Equipment Under Test (EUT)

Product Name: Industrial 3G/4G Cellular Router

Model No.: WL-G500

Applicable standards: ETSI EN 301 908-1 V11.1.1 (2016-07)
ETSI EN 301 908-2 V11.1.1 (2016-07)
ETSI EN 301 908-13 V11.1.1 (2016-07)
ETSI EN 301 511 V12.5.1 (2017-03)

Date of sample receipt: May 27, 2017

Date of Test: May 27-June 23, 2017

Date of report issued: June 28, 2017

Test Result : PASS *

*In the configuration tested, the EUT complied with the standards specified above.

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives. The protection requirements with respect to electromagnetic compatibility contained in Directive 2014/53/EU are considered.



Robinson Lo
Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver

2 Version

Version No.	Date	Description
00	June 28, 2017	Remark: All of the radio reports refers to EH/2017/30015, EU/2017/30023B, EG/2017/30037E, EG/2017/30037D

Prepared By:

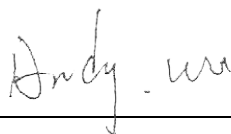


Date:

June 28, 2017

Project Engineer

Check By:



Date:

June 28, 2017

Reviewer

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4 Test Summary

UTRA FDD (EN 301 908-1 V11.1.1/EN 301 908-2 V11.1.1)				
Test Item	Test Requirement	Test method	Limit/Severity	Result
Radiated emissions	ETSI EN 301 908-1 Section 4.2.2	ETSI EN 301 908-1 Section 5.3.1	Table 4.2.2.2-1	Pass
E-UTRA (EN 301 908-1 V11.1.1/EN 301 908-13 V11.1.1)				
Test Item	Test Requirement	Test method	Limit/Severity	Result
Radiated emissions	ETSI EN 301 908-1 Section 4.2.2	ETSI EN 301 908-1 Section 5.3.1	Table 4.2.2.2-1	Pass
GSM(301 511 V12.5.1)				
Test Item	Test Requirement	Test method	Limit/Severity	Result
Transmitter unwanted emissions in the spurious domain	Clause 4.2.16 Clause 4.2.17 Clause 4.2.18	Clause 5.3.16 Clause 5.3.17 Clause 5.3.18	Clause 12.2.1.1 Clause 12.2.1.2	Pass
Receiver spurious emissions	Clause 4.2.20	Clause 5.3.20	Clause 14.7.1.1 Clause 14.7.1.2	Pass

Remark:

Pass: The EUT complies with the essential requirements in the standard.

5 General Information

5.1 General Description of EUT

Product Name:	Industrial 3G/4G Cellular Router
Model No.:	WL-G500
Operation Frequency:	LTE: 1,3,7,8,20 WCDMA:900/2100MHz GSM:900/1800MHz
Modulation Type:	WCDMA/LTE: QPSK, 16QAM GSM: GMSK,8PSK
Antenna Type:	Integrated antenna
Antenna Gain:	Main Antenna:3.0dBi(declared by Applicant) Aux Antenna: 3.0dBi (declared by Applicant)
Power Supply:	Adapter Model:RD1201500-C55-1OG INPUT: AC 100-240V,50/60Hz,0.6A Max OUTPUT: DC 12V1.5A

Remark: the main antenna for transmitting, the Aux antenna for receiving

5.2 Description of Support Units

The EUT was test as an independent unit

5.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC —Registration No.: 600491**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 600491, June 22, 2016.

- **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. Has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, August 15, 2016.

5.4 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China

Tel: 0755-27798480

Fax: 0755-27798960

5.5 Deviation from Standards

None

5.6 Other Information Requested by the Customer

None.

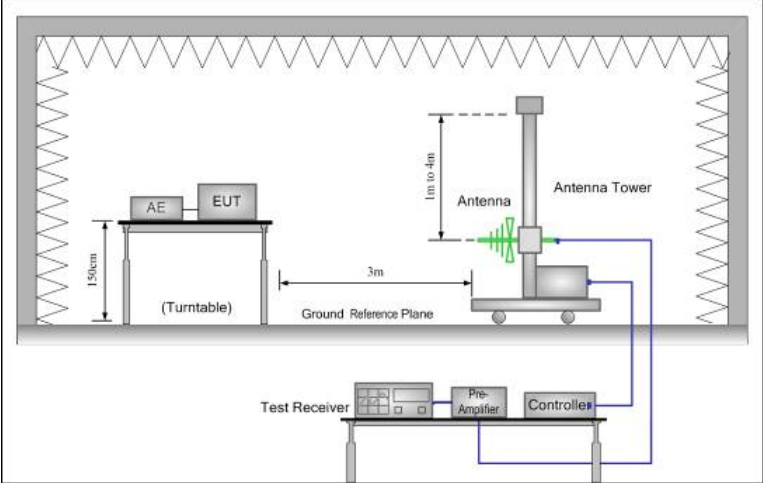
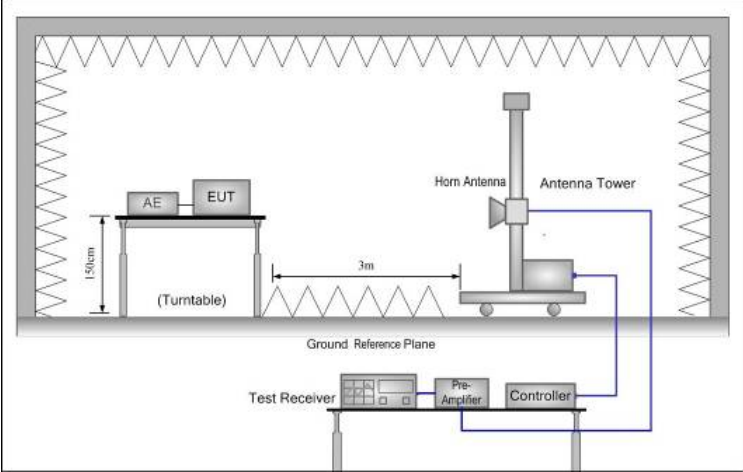
6 Test Instruments List

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 29 2016	June. 28 2017
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 29 2016	June. 28 2017
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June. 29 2016	June. 28 2017
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 29 2016	June. 28 2017
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 29 2016	June. 28 2017
9	Coaxial Cable	GTS	N/A	GTS211	June. 29 2016	June. 28 2017
10	Coaxial cable	GTS	N/A	GTS210	June. 29 2016	June. 28 2017
11	Coaxial Cable	GTS	N/A	GTS212	June. 29 2016	June. 28 2017
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 29 2016	June. 28 2017
13	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	June. 29 2016	June. 28 2017
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 29 2016	June. 28 2017
15	Band filter	Amindeon	82346	GTS219	June. 29 2016	June. 28 2017
16	Constant temperature and humidity box	Oregon Scientific	BA-888	GTS248	June. 29 2016	June. 28 2017
17	D.C. Power Supply	Instek	PS-3030	GTS232	June. 29 2016	June. 28 2017
18	Universal radio communication tester	Rohde & Schwarz	CMU200	GTS235	June. 29 2016	June. 28 2017
19	Baseband Signal Generator and Fading Simulator	Rohde & Schwarz	AMU200A	GTS632	June. 29 2016	June. 28 2017
20	Splitter	Agilent	11636B	GTS237	June. 29 2016	June. 28 2017
21	Signal Generator	Rohde & Schwarz	SML03	GTS236	June. 29 2016	June. 28 2017

Conducted:						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Signal Analyzer	Agilent	N9010A	MY48030494	June. 29 2016	June. 28 2017
2	vector Signal Generator	Agilent	E4438C	MY49070163	June. 29 2016	June. 28 2017
3	splitter	Mini-Circuits	ZAP-50W	NN256400424	June. 29 2016	June. 28 2017
4	Directional Coupler	Agilent	87300C	MY44300299	June. 29 2016	June. 28 2017
5	vector Signal Generator	Agilent	E4438C	US44271917	June. 29 2016	June. 28 2017
6	X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY54080020	June. 29 2016	June. 28 2017
7	X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY54110001	June. 29 2016	June. 28 2017
8	X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY53480008	June. 29 2016	June. 28 2017
9	X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY54080019	June. 29 2016	June. 28 2017
10	4 Ch.Simultaneous Sampling 14 Bits 2 MS/s	Agilent	U2531A	TW54063507	June. 29 2016	June. 28 2017
11	4 Ch.Simultaneous Sampling 14 Bits 2 MS/s	Agilent	U2531A	TW54063513	June. 29 2016	June. 28 2017
12	splitter	Mini	PS3-7	4463	June. 29 2016	June. 28 2017

6.1 Radiated Spurious emissions

Test Requirement:	WCDMA/LTE: ETSI EN 301 908-1 clause 4.2.2 GSM:ETSI EN 301 511 V12.5.1			
Test Method:	WCDMA/LTE: ETSI EN 301 908-1 clause 5.3.1 GSM:ETSI TS 151 010-1 V13.3.0			
Receiver setup:	Below 1GHz :RBW=100KHz, VBW=30KHz, Detector= peak Above 1GHz :RBW=1MHz, VBW=3MHz,Detector=Peak			
Limit:	WCDMA/LTE			
	Frequency		Limit	
	30MHz to 1000 MHz		-36dBm	
	1GHz to 12.75GHz		-30dBm	
	GPS:			
	Frequency	Limit(narrowband)	Limit(wideband)	
	30MHz to 1000 MHz	2nW(-57dBm)	-107dBm/Hz	
	1GHz to 12.75GHz	20nW(-47dBm)	-97dBm/Hz	
	GSM(Transmitting)			
	Frequency range		Power level in dBm	
		GSM 400, GSM 700, T-GSM 810, GSM 850, GSM 900	DCS 1 800	PCS 1 900
30 MHz to 1 GHz		-36	-36	-36
1 GHz to 4 GHz		-30		-30
1 GHz to 1 710 MHz			-30	
1 710 MHz to 1 785 MHz			-36	
1 785 MHz to 4 GHz			-30	
GSM(receiving)				
Frequency range		Power level in dBm		
		GSM 400, T-GSM 810, GSM 900, DCS 1 800	GSM 700, GSM 850, PCS 1 900	
30 MHz to 880 MHz		-57	-57	
880 MHz to 915 MHz		-59	-57	
915 MHz to 1 000 MHz		-57	-57	
1 GHz to 1 710 MHz		-47		
1 710 MHz to 1 785 MHz		-53		
1 785 MHz to 4GHz		-47		
1 GHz to 1 850 MHz			-47	
1 850 MHz to 1 910 MHz			-53	
1 910 MHz to 4GHz			-47	
Test mode:	Kept UE in Transmitting mode			

Test Instruments:	See section 6.0
Test Frequency range:	WCDMA/LTE & GSM:30MHz to 12.75GHz
Test setup:	<p>Below 1GHz</p>  <p>Above 1GHz</p> 
Test procedure:	<p>Substitution method was performed to determine the actual ERP emission levels of the EUT.</p> <p>The following test procedure as below:</p> <p>1>.Below 1GHz test procedure:</p> <ol style="list-style-type: none"> 1. On the test site as test setup graph above,the EUT shall be placed at the 1.5m support on the turntable and in the position closest to normal use as declared by the provider. 2. The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter.The output of the test antenna shall be connected to the measuring receiver. 3. The transmitter shall be switched on, if possible, without modulation and the measuring receiver shall be tuned to the frequency of the transmitter under test. 4. The test antenna shall be raised and lowered from 1m to 4m until a maximum signal level is detected by the measuring receiver. Then the turntable should be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

	<p>5. Repeat step 4 for test frequency with the test antenna polarized horizontally.</p> <p>6. Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At the lower frequencies, where the substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.</p> <p>7. Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a nonradiating cable. With the antennas at both ends vertically polarized, and with the signal generator tuned to a particular test frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.</p> <p>8. Repeat step 7 with both antennas horizontally polarized for each test frequency.</p> <p>9. Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps 7 and 8 by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula: $ERP(dBm) = P_g(dBm) - \text{cable loss (dB)} + \text{antenna gain (dB)}$ where: P_g is the generator output power into the substitution antenna.</p> <p>2>.Above 1GHz test procedure: Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber, and the test antenna do not need to raise from 1 to 4m, just test in 1.5m height.</p>
Measurement Record:	Uncertainty: ± 6dB

Measurement Data:

GSM 900:

Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
79.15	Vertical	-73.19	-36 dBm below 1GHz, -30 dBm above 1GHz.	Pass
594.56	V	-73.34		
1774.40	V	-37.93		
2661.60	V	-43.12		
3548.80	V	-44.45		
86.14	Horizontal	-73.30		
917.07	H	-73.75		
1774.40	H	-37.18		
2661.60	H	-41.87		
3548.80	H	-43.68		

GSM 1800:

Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
98.04	Vertical	-66.31	-36 dBm below 1GHz, -30 dBm above 1GHz.	Pass
726.52	V	-69.61		
1280.00	V	-51.39		
2580.00	V	-52.75		
3600.00	V	-53.83		
36.59	Horizontal	-67.93		
964.96	H	-66.23		
1280.00	H	-52.10		
2580.00	H	-53.10		
3600.00	H	-54.17		

WCDMA:

Band I

Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
130.43	Vertical	-66.24	-36 dBm below 1GHz, -30 dBm above 1GHz.	Pass
509.31	V	-69.73		
4100.00	V	-40.44		
5865.00	V	-42.81		
7868.00	V	-39.81		
124.91	Horizontal	-56.80		
527.26	H	-68.77		
4100.00	H	-47.04		
5865.00	H	-44.34		
7868.00	H	-39.69		

Band VIII

Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
123.22	Vertical	-62.06	-36 dBm below 1GHz, -30 dBm above 1GHz.	Pass
401.83	V	-65.37		
4414.00	V	-38.34		
6179.00	V	-38.55		
8182.00	V	-37.73		
39.88	Horizontal	-52.74		
610.10	H	-64.63		
4414.00	H	-37.70		
6179.00	H	-38.48		
8182.00	H	-36.69		

**LTE:
Band 1**

Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
135.96	Vertical	-64.54	-36 dBm below 1GHz, -30 dBm above 1GHz.	Pass
460.25	V	-67.49		
4280.00	V	-40.50		
6420.00	V	-41.35		
8560.00	V	-40.71		
49.55	Horizontal	-54.77		
654.25	H	-67.20		
4280.00	H	-40.09		
6420.00	H	-40.64		
8560.00	H	-39.40		

Band 3

Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
145.52	Vertical	-66.37	-36 dBm below 1GHz, -30 dBm above 1GHz.	Pass
599.31	V	-69.84		
3494.00	V	-40.55		
6988.00	V	-42.96		
10482.00	V	-39.97		
139.00	Horizontal	-56.91		
605.74	H	-68.91		
3494.00	H	-47.17		
6988.00	H	-44.45		
10482.00	H	-39.84		

Band 7

Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
135.96	Vertical	-63.77	-36 dBm below 1GHz, -30 dBm above 1GHz.	Pass
460.00	V	-66.83		
5070.00	V	-39.83		
7605.00	V	-40.48		
10140.00	V	-39.78		
49.61	Horizontal	-54.13		
662.24	H	-66.40		
5070.00	H	-39.34		
7605.00	H	-39.97		
10140.00	H	-38.55		

Band 8

Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
145.52	Vertical	-67.15	-36 dBm below 1GHz, -30 dBm above 1GHz.	Pass
599.31	V	-70.51		
1760.00	V	-41.23		
2640.00	V	-43.84		
3520.00	V	-40.90		
139.00	Horizontal	-57.54		
605.44	H	-69.71		
1760.00	H	-47.91		
2640.00	H	-45.13		
3520.00	H	-40.68		

Band 20

Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
139.42	Vertical	-65.23	-36 dBm below 1GHz, -30 dBm above 1GHz.	Pass
480.47	V	-70.17		
1694.00	V	-42.09		
2541.00	V	-41.52		
4235.00	V	-43.22		
50.84	Horizontal	-66.50		
691.14	H	-69.38		
1694.00	H	-40.83		
2541.00	H	-42.01		
4235.00	H	-41.58		

7 Test Setup Photo



8 EUT Constructional Details

Reference to the test report No. GTSE201705000233E01

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