

RF Exposure

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: EN 62311:2008

Date of sample receipt: May 27, 2017

Date of Test: May 27-June 23, 2017

Date of report issue: 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: Tiger Chen **Date:** June 28, 2017
Project Engineer

Check By: Andy Wu **Date:** June 28, 2017
Reviewer

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4 General Information

4.1 General Description of EUT

Product Name:	Industrial 3G/4G Cellular Router
Model No.:	WL-G500
Power Supply:	Adapter Model:RD1201500-C55-1OG INPUT: AC 100-240V,50/60Hz,0.6A Max OUTPUT: DC 12V1.5A
WIFI	
Operation Frequency:	2412MHz~2472MHz(802.11b/802.11g/802.11n(H20)@2.4G band) 2422MHz~2462MHz(802.11n(H40)@2.4G band) 5180MHz~5240MHz (802.11a/802.11n(HT20)/802.11ac(HT20) @ 5G band) 5190MHz ~ 5230MHz (802.11n(HT40)/802.11ac(HT40)@5G band) 5210MHz (802.11ac(HT80)@5G band)
Channel Separation:	5MHz @2.4G band 20MHz for 802.11a/802.11n(HT20)/ 802.11ac(HT20)@ 5G band 40MHz for 802.11n(HT40) /802.11ac(HT40) @ 5G band 80MHz for 802.11ac(HT80) @ 5G band
Modulation Type: (IEEE 802.11b)	Direct Sequence Spread Spectrum(DSSS)
Modulation Type: (IEEE 802.11a/802.11g/ 802.11n/802.11ac)	Orthogonal Frequency Division Multiplexing(OFDM)
Antenna Type:	Integrated antenna
Antenna Gain:	Main Antenna:3.0dBi @2.4G, 3.0@5G(declared by Applicant) Aux Antenna: 3.0dBi@2.4G, 3.0@5G(declared by Applicant)
5.8G	
Operation Frequency:	5745MHz~5825MHz(802.11a/802.11n(HT20)/802.11ac(HT20)) 5755MHz~5795MHz(802.11n(HT40)/802.11ac(HT40)) 5775MHz(802.11ac(HT80))
Channel Separation:	20MHz for 802.11a/802.11ac(HT20)/802.11n(HT20) 40MHz for 802.11n(HT40)/802.11ac(HT40) 80MHz for 802.11ac(HT80)
Modulation Type:	OFDM
Antenna Type:	Integrated Antenna
Antenna Gain:	Main Antenna: 3.0dBi(declared by Applicant) Aux Antenna: 3.0dBi(declared by Applicant)
2G/3G/4G	
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:	3.0dBi(declared by applicant)

4.2 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.

4.3 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Address: No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102

Tel: 0755-27798480

Fax: 0755-27798960

4.4 Description of Support Units

The EUT has been tested as an independent unit.

4.5 Deviation from Standards

None.

4.6 Abnormalities from Standard Conditions

None.

4.7 Other Information Requested by the Customer

None.

5 Technical Requirements Specification in EN 62311

Test Requirement:	EN 62311																																																												
Test Method:	EN 62311																																																												
General Description of Applied Standards	EN 62311 Generic standard to demonstrate the compliance of electronic and electrical apparatus with the basic restrictions related to human exposure to electromagnetic fields (0 Hz–300 GHz) is to demonstrate the compliance of apparatus with the basic restrictions or reference levels on exposure of the general public related to electric, magnetic, electromagnetic fields as well as induced and contact current.																																																												
Limit:	<p>According to EN 62311, the criteria listed in the below table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified table 2 of Council Recommendation 1999/519/EC.</p> <p style="text-align: center;">Reference levels for electric, magnetic and electromagnetic fields (0 Hz to 300 GHz, unperturbed rms values)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Frequency range</th> <th>E-field strength (V/m)</th> <th>H-field strength (A/m)</th> <th>B-field (μT)</th> <th>Equivalent plane wave power density S_{eq} (W/m²)</th> </tr> </thead> <tbody> <tr> <td>0-1 Hz</td> <td>—</td> <td>$3,2 \times 10^4$</td> <td>4×10^4</td> <td>—</td> </tr> <tr> <td>1-8 Hz</td> <td>10 000</td> <td>$3,2 \times 10^4 f^2$</td> <td>$4 \times 10^4 f^2$</td> <td>—</td> </tr> <tr> <td>8-25 Hz</td> <td>10 000</td> <td>$4 000/f$</td> <td>$5 000/f$</td> <td>—</td> </tr> <tr> <td>0,025-0,8 kHz</td> <td>$250/f$</td> <td>$4/f$</td> <td>$5/f$</td> <td>—</td> </tr> <tr> <td>0,8-3 kHz</td> <td>$250/f$</td> <td>5</td> <td>6,25</td> <td>—</td> </tr> <tr> <td>3-150 kHz</td> <td>87</td> <td>5</td> <td>6,25</td> <td>—</td> </tr> <tr> <td>0,15-1 MHz</td> <td>87</td> <td>$0,73/f$</td> <td>$0,92/f$</td> <td>—</td> </tr> <tr> <td>1-10 MHz</td> <td>$87 f^{0,2}$</td> <td>$0,73/f$</td> <td>$0,92/f$</td> <td>—</td> </tr> <tr> <td>10-400 MHz</td> <td>28</td> <td>0,073</td> <td>0,092</td> <td>2</td> </tr> <tr> <td>400-2 000 MHz</td> <td>$1,375 f^{0,2}$</td> <td>$0,0037 f^{0,2}$</td> <td>$0,0046 f^{0,2}$</td> <td>$f/200$</td> </tr> <tr> <td>2-300 GHz</td> <td>61</td> <td>0,16</td> <td>0,20</td> <td>10</td> </tr> </tbody> </table> <p>Notes: 1. f as indicated in the frequency range column.</p>	Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (μT)	Equivalent plane wave power density S_{eq} (W/m ²)	0-1 Hz	—	$3,2 \times 10^4$	4×10^4	—	1-8 Hz	10 000	$3,2 \times 10^4 f^2$	$4 \times 10^4 f^2$	—	8-25 Hz	10 000	$4 000/f$	$5 000/f$	—	0,025-0,8 kHz	$250/f$	$4/f$	$5/f$	—	0,8-3 kHz	$250/f$	5	6,25	—	3-150 kHz	87	5	6,25	—	0,15-1 MHz	87	$0,73/f$	$0,92/f$	—	1-10 MHz	$87 f^{0,2}$	$0,73/f$	$0,92/f$	—	10-400 MHz	28	0,073	0,092	2	400-2 000 MHz	$1,375 f^{0,2}$	$0,0037 f^{0,2}$	$0,0046 f^{0,2}$	$f/200$	2-300 GHz	61	0,16	0,20	10
Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (μT)	Equivalent plane wave power density S_{eq} (W/m ²)																																																									
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2-300 GHz	61	0,16	0,20	10																																																									
Test method:	<p>According to the Far field calculation formula:</p> <p style="text-align: center;">Far Field Calculation Formula</p> $E = \frac{\sqrt{30PG(\theta, \phi)}}{r}$ <p>G = antenna gain relative to an isotropic antenna θ, ϕ = elevation and azimuth angles to point of investigation r = distance from observation point to the antenna</p> <p>The antenna of the product, under normal use condition is at least 20cm away from the body of the user. Warning statement of the user for keeping 20cm separation distance and the prohibition of operating to a person has been printed on the user manual. So, this product under normal use is located on electromagnetic far field between the human body.</p>																																																												
Result:	Pass																																																												

Measurement Data:**Only the worst case shows**

2.4G Wifi

Main Antenna:

802.11b mode					
Frequency (MHz)	Output Power (dBm)	Output Power (mW)	E Field Strength (V/m)	Limit (V/m)	Result
2412	17.73	59.293	11.550	61.00	Pass
2442	17.35	54.325	11.056		
2472	17.99	62.951	11.901		

MIMO:

802.11n(H20) mode					
Frequency (MHz)	Output Power (dBm)	Output Power (mW)	E Field Strength (V/m)	Limit (V/m)	Result
2412	15.23	33.343	12.259	61.00	Pass
2442	15.86	38.548	13.182		
2472	15.61	36.392	12.808		

5G Wifi

Main Antenna:

802.11a(HT20)					
Frequency (MHz)	Output Power (dBm)	Output Power (mW)	E Field Strength (V/m)	Limit (V/m)	Result
5180	12.01	15.885	5.978	61.00	Pass

MIMO:

802.11ac(HT20) mode					
Frequency (MHz)	Output Power (dBm)	Output Power (mW)	E Field Strength (V/m)	Limit (V/m)	Result
5180	13.62	23.014	10.185	61.00	Pass

5.8G Wifi

Main Antenna:

802.11a(HT20)					
Frequency (MHz)	Output Power (dBm)	Output Power (mW)	E Field Strength (V/m)	Limit (V/m)	Result
5745	12.40	17.378	6.253	61.00	Pass

MIMO:

802.11n(HT20) mode					
Frequency (MHz)	Output Power (dBm)	Output Power (mW)	E Field Strength (V/m)	Limit (V/m)	Result
5825	12.19	16.558	8.639	61.00	Pass

Operation in GSM900

(uplink: 880-915MHz, downlink: 925-960MHz)

Mode	P _{max} (dBm)	Gain (dBi)	EIRP _{max} (dBm)	EIRP _{max} (W)	R (m)	E (v/m)	Reference Level(v/m)	Conclusion
1TS*(1/8)	33.0	3.0	36.00	3.981	0.30	36.472	40.79	PASS
2TS*(2/8)	31.0	3.0	34.00	2.511	0.30	28.936	40.49	PASS
3TS*(3/8)	30.0	3.0	33.00	1.995	0.30	25.789	40.79	PASS
4TS*(4/8)	28.0	3.0	31.00	1.259	0.30	20.509	40.79	PASS

Note:*- based on the maximum tune-up tolerance limit declared by manufacturer. According to the Table above, we can conclude the maximum E-field strength of observation point with a distance from the point to the antenna 0.3m is 36.472V/m, which is below the reference level of 40.79 V/m at 880MHz, so it is into compliance.

Operation in GSM1800

(uplink: 1710-1785MHz, downlink: 1805-1880MHz)

Mode	P _{max} (dBm)	Gain (dBi)	EIRP _{max} (dBm)	EIRP _{max} (W)	R (m)	E (v/m)	Reference Level(v/m)	Conclusion
1TS*(1/8)	30.0	3.0	33.0	1.995	0.30	25.789	56.86	PASS
2TS*(2/8)	28.0	3.0	31.0	1.259	0.30	20.509	56.86	PASS
3TS*(3/8)	27.0	3.0	30.0	0.501	0.30	18.279	56.86	PASS
4TS*(4/8)	25.0	3.0	28.0	0.316	0.30	14.502	56.86	PASS

Note:*- based on the maximum tune-up tolerance limit declared by manufacturer According to the Table above, we can conclude the maximum E-field strength of observation point with a distance from the point to the antenna 0.3m is 25.789V/m, which is below the reference level of 56.86 V/m at 1710MHz, so it is into compliance.

Operation in UMTS Band I

(uplink: 1920-1980MHz, downlink: 2110-2170MHz)

P _{max} (dBm)	Gain (dBi)	EIRP _{max} (dBm)	EIRP _{max} (W)	R (m)	E (v/m)	Reference Level(v/m)	Conclusion
24.0	3.0	27.0	0.501	0.30	12.941	60.25	PASS

Note:*- based on the maximum tune-up tolerance limit declared by manufacturer According to the Table above, we can conclude the maximum E-field strength of observation point with a distance from the point to the antenna 0.3m is 12.941V/m, which is below the reference level of 60.25 V/m at 1920MHz, so it is into compliance.

Operation in UMTS Band VIII

(uplink: 880-915MHz, downlink: 925-960MHz)

P _{max} (dBm)	Gain (dBi)	EIRP _{max} (dBm)	EIRP _{max} (W)	R (m)	E (v/m)	Reference Level(v/m)	Conclusion
24.0	3.0	27.0	0.501	0.30	12.941	40.79	PASS

Note:*- based on the maximum tune-up tolerance limit declared by manufacturer According to the Table above, we can conclude the maximum E-field strength of observation point with a distance from the point to the antenna 0.3m is 12.941 0V/m, which is below the reference level of 40.79 V/m at 880MHz, so it is into compliance.

Operation in LTE Band I

(uplink: 1920-1980MHz, downlink: 2110-2170MHz)

P_{max} (dBm)	Gain (dBi)	$EIRP_{max}$ (dBm)	$EIRP_{max}$ (W)	R (m)	E (v/m)	Reference Level(v/m)	Conclusion
23.5	3.0	26.5	0.447	0.30	12.202	60.25	PASS

Note:*- based on the maximum tune-up tolerance limit declared by manufacturer According to the Table above, we can conclude the maximum E-field strength of observation point with a distance from the point to the antenna 0.3m is 12.202V/m, which is below the reference level of 60.25 V/m at 1920MHz, so it is into compliance.

Operation in LTE Band III

(uplink: 1710-1785MHz, downlink: 1805-1880MHz)

P_{max} (dBm)	Gain (dBi)	$EIRP_{max}$ (dBm)	$EIRP_{max}$ (W)	R (m)	E (v/m)	Reference Level(v/m)	Conclusion
23.5	3.0	26.5	0.447	0.30	12.202	56.86	PASS

Note:*- based on the maximum tune-up tolerance limit declared by manufacturer According to the Table above, we can conclude the maximum E-field strength of observation point with a distance from the point to the antenna 0.3m is 12.202V/m, which is below the reference level of 56.86 V/m at 1710MHz, so it is into compliance.

Operation in LTE Band VII

(uplink: 2500-2570MHz, downlink: 2620-2690MHz)

P_{max} (dBm)	Gain (dBi)	$EIRP_{max}$ (dBm)	$EIRP_{max}$ (W)	R (m)	E (v/m)	Reference Level(v/m)	Conclusion
23.5	3.0	26.5	0.447	0.30	12.202	61.00	PASS

Note:*- based on the maximum tune-up tolerance limit declared by manufacturer According to the Table above, we can conclude the maximum E-field strength of observation point with a distance from the point to the antenna 0.3m is 12.202V/m, which is below the reference level of 61.00 V/m at 2500MHz, so it is into compliance.

Operation in LTE Band VIII

(uplink: 880-915MHz, downlink: 925-960MHz)

P_{max} (dBm)	Gain (dBi)	$EIRP_{max}$ (dBm)	$EIRP_{max}$ (W)	R (m)	E (v/m)	Reference Level(v/m)	Conclusion
23.5	3.0	26.5	0.447	0.30	12.202	40.79	PASS

Note:*- based on the maximum tune-up tolerance limit declared by manufacturer According to the Table above, we can conclude the maximum E-field strength of observation point with a distance from the point to the antenna 0.3m is 12.202V/m, which is below the reference level of 40.79 V/m at 880MHz, so it is into compliance.

Operation in LTE Band XX

(uplink: 832-862MHz, downlink: 791-821MHz)

P_{max} (dBm)	Gain (dBi)	$EIRP_{max}$ (dBm)	$EIRP_{max}$ (W)	R (m)	E (v/m)	Reference Level(v/m)	Conclusion
23.5	3.0	26.5	0.447	0.30	12.202	39.66	PASS

Note:*- based on the maximum tune-up tolerance limit declared by manufacturer According to the Table above, we can conclude the maximum E-field strength of observation point with a distance from the point to the antenna 0.3m is 12.202V/m, which is below the reference level of 39.66 V/m at 832MHz, so it is into compliance.

-----End-----