SPECTRUM REPORT (WCDMA)

Applicant:	SHENZHEN WLINK TECHNOLOGY CO., LIMITED
Address of Applicant:	319,YiBen Electronic Business Building, NO.1063 ChaGuang Road, XiLi, NanShan District, ShenZhen, China
Manufacturer:	SHENZHEN WLINK TECHNOLOGY CO., LIMITED
Address of Manufacturer:	319,YiBen Electronic Business Building, NO.1063 ChaGuang Road, XiLi, NanShan District, ShenZhen, China

Equipment Under Test (EUT)

Product Name:	Industrial Cellular Router
Model No.:	WL-R100
Applicable standards:	ETSI EN 301 908-1 V11.1.1 (2016-07) ETSI EN 301 908-2 V11.1.1 (2016-07)
Date of sample receipt:	June 27, 2017
Date of Test:	June 28-July 04, 2017
Date of report issued:	July 05, 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

2 Version

Version No.	Date	Description
00	*July 05, 2017*	*Original*

Prepared By: Edward.Pan ***Date:*** *July 05, 2017*

Project Engineer

Check By: Andy.Wu ***Date:*** *July 05, 2017*

Reviewer

3 Contents

Page

4 Test Summary

Test Item	Test Requirement	Test method	Limit/Severity	Result
Transmitter maximum output power	ETSI EN 301 908-2 section 4.2.2	ETSI EN 301 908-2 section 5.3.1	24dBm	N/A
Transmitter spectrum emission mask	ETSI EN 301 908-2 section 4.2.3	ETSI EN 301 908-2 section 5.3.2	Table 4.2.3.1.2-1	N/A
Transmitter spurious emissions	ETSI EN 301 908-2 section 4.2.4	ETSI EN 301 908-2 section 5.3.3	Table 4.2.4.1.2-1 Table 4.2.4.1.2-2	N/A
Transmitter minimum output power	ETSI EN 301 908-2 section 4.2.5	ETSI EN 301 908-2 section 5.3.4	-49dBm	N/A
Transmitter adjacent channel leakage power ratio	ETSI EN 301 908-2 section 4.2.12	ETSI EN 301 908-2 section 5.3.11	Table 4.2.12.1.2-1	N/A
Out-of-synchronization handling of output power	ETSI EN 301 908-2 section 4.2.11	ETSI EN 301 908-2 section 5.3.10	Table 4.2.11.2-1 Table 4.2.11.2-2	N/A
Receiver adjacent channel selectivity (ACS)	ETSI EN 301 908-2 section 4.2.6	ETSI EN 301 908-2 section 5.3.5	Table 4.2.6.2-1	N/A
Receiver blocking characteristics	ETSI EN 301 908-2 section 4.2.7	ETSI EN 301 908-2 section 5.3.6	Table 4.2.7.2-1	N/A
Receiver spurious response	ETSI EN 301 908-2 section 4.2.8	ETSI EN 301 908-2 section 5.3.7	Table 4.2.8.2-1	N/A
Receiver intermodulation characteristics	ETSI EN 301 908-2 section 4.2.9	ETSI EN 301 908-2 section 5.3.8	Table 4.2.9.2-1	N/A
Receiver Reference Sensitivity level	ETSI EN 301 908-2 section 4.2.13	ETSI EN 301 908-2 section 5.3.12	Table 4.2.13.2-1	N/A
Receiver spurious emissions	ETSI EN 301 908-2 section 4.2.10	ETSI EN 301 908-2 section 5.3.9	Table 4.2.10.2-1 Table 4.2.10.2-2	N/A
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
Control and monitoring functions	ETSI EN 301 908-1 Section 4.2.4	ETSI EN 301 908-1 Section 5.3.3	-30dBm	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 Cellular Router
Model No.:	WL-R100
Operation Frequency:	Band I:1920MHz~1980MHz Band VIII:880MHz~915MHz
Modulation Type:	WCDMA:QPSK HSDPA:QPSK, 16QAM HSUPA:QPSK, 16QAM
Antenna Type:	Integral Antenna
Antenna Gain:	1.0dBi(WCDMA I) 1.0dBi(WCDMA VIII)
Power Supply:	Adapter Model No.: TS-A018-120015EJ Input: AC 100-240V, 50/60Hz, 0.5A Output: DC 12V, 1.5A

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 fuly 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.

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

5.5 Deviation from Standards

None

5.6 Other Information Requested by the Customer

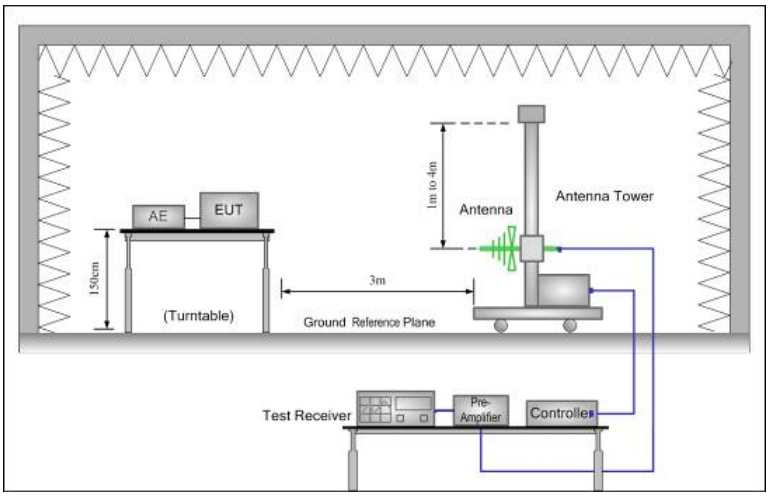
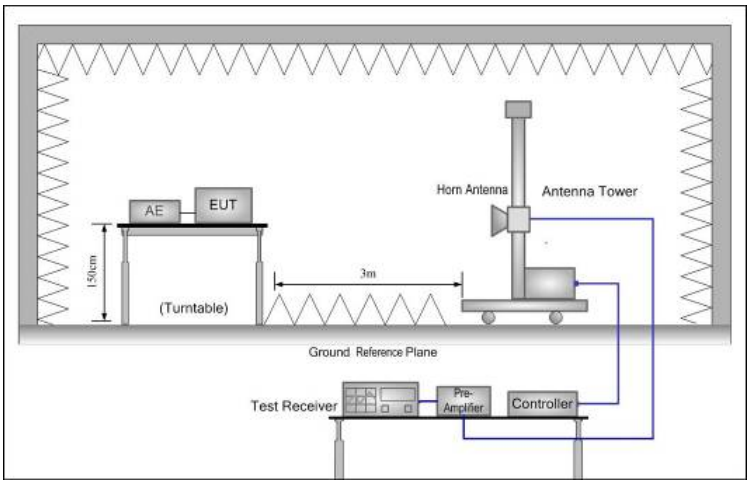
None.

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. 28 2017	June. 27 2018
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 28 2017	June. 27 2018
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June. 28 2017	June. 27 2018
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 28 2017	June. 27 2018
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 28 2017	June. 27 2018
9	Coaxial Cable	GTS	N/A	GTS211	June. 28 2017	June. 27 2018
10	Coaxial cable	GTS	N/A	GTS210	June. 28 2017	June. 27 2018
11	Coaxial Cable	GTS	N/A	GTS212	June. 28 2017	June. 27 2018
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 28 2017	June. 27 2018
13	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	June. 28 2017	June. 27 2018
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 28 2017	June. 27 2018
15	Band filter	Amindeon	82346	GTS219	June. 28 2017	June. 27 2018
16	Constant temperature and humidity box	Oregon Scientific	BA-888	GTS248	June. 28 2017	June. 27 2018
17	D.C. Power Supply	Instek	PS-3030	GTS232	June. 28 2017	June. 27 2018
18	Universal radio communication tester	Rohde & Schwarz	CMU200	GTS235	June. 28 2017	June. 27 2018
19	Baseband Signal Generator and Fading Simulator	Rohde & Schwarz	AMU200A	GTS632	June. 28 2017	June. 27 2018
20	Splitter	Agilent	11636B	GTS237	June. 28 2017	June. 27 2018
21	Signal Generator	Rohde & Schwarz	SML03	GTS236	June. 28 2017	June. 27 2018

7 Radio Technical Requirements Specification in ETSI EN 301 908-1/-2

7.1 Radiated emissions

Test Requirement:	ETSI EN 301 908-1 clause 4.2.2
Test Method:	ETSI EN 301 908-1 clause 5.3.1
Receiver setup:	Below 1GHz :RBW=100KHz, VBW=30KHz, Detector= peak Above 1GHz :RBW=1MHz, VBW=3MHz,Detector=Peak
Limit:	Frequency: 30MHz to 1000 MHz — Limit: -36dBm Frequency: 1GHz to 12.75GHz — Limit: -30dBm
Test mode:	Kept UE in Transmitting mode
Test Instruments:	See section 6.0
Test Frequency range:	30MHz to 12.75GHz
Test setup:	Below 1GHz  Above 1GHz 
Test procedure:	Substitution method was performed to determine the actual ERP emission levels of the EUT.

	The following test procedure as below: 1>.Below 1GHz test procedure: 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. 5. Repeat step 4 for test frequency with the test antenna polarized horizontally. 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. 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. 8. Repeat step 7 with both antennas horizontally polarized for each test frequency. 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) = Pg(dBm) – cable loss (dB) + antenna gain (dBd) where: Pg is the generator output power into the substitution antenna. 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.
Measurement Record:	Uncertainty: ± 6dB

Measurement Data:

Band I

Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
185.02	Vertical	-66.77	-36 dBm below 1GHz, -30 dBm above 1GHz.	Pass
629.64	V	-70.19		
4100.00	V	-40.90		
5865.00	V	-43.42		
7868.00	V	-40.45		
175.87	Horizontal	-57.24		
632.18	H	-69.33		
4100.00	H	-47.55		
5865.00	H	-44.80		
7868.00	H	-40.27		

Band VIII

Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
169.32	Vertical	-62.59	-36 dBm below 1GHz, -30 dBm above 1GHz.	Pass
479.60	V	-65.83		
4414.00	V	-38.80		
6179.00	V	-39.16		
8182.00	V	-38.37		
75.07	Horizontal	-53.18		
679.81	H	-65.19		
4414.00	H	-38.21		
6179.00	H	-38.94		
8182.00	H	-37.27		

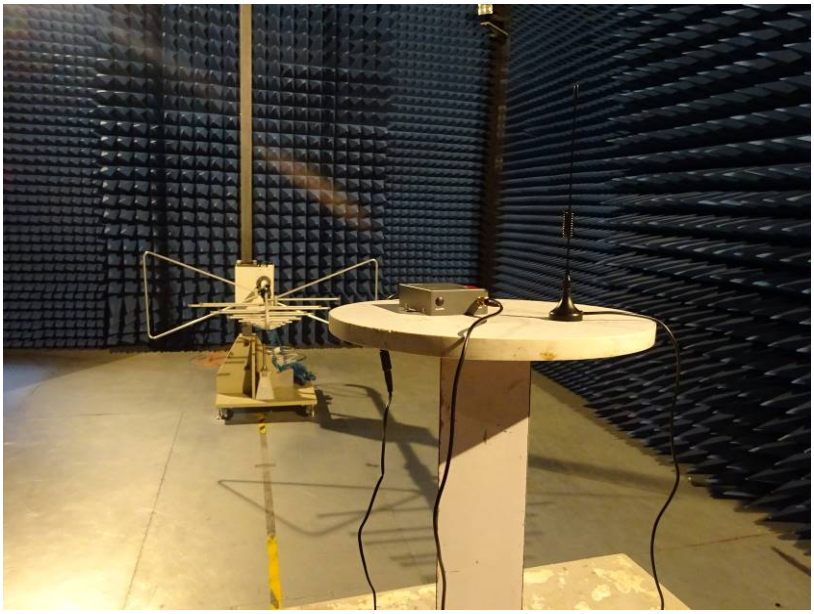
7.2 Control and monitoring functions

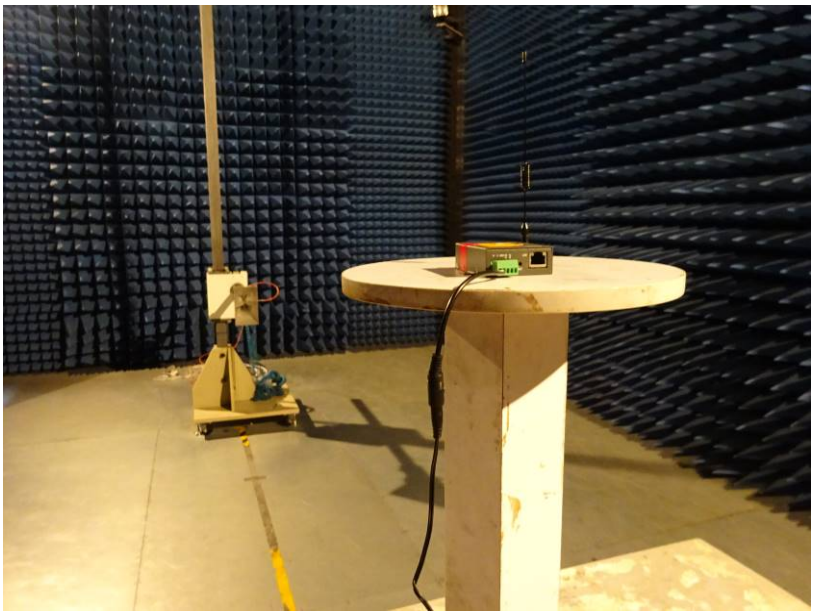
Test Requirement:	ETSI EN 301 908-1 clause 4.2.4
Test Method:	ETSI EN 301 908-2 clause 5.3.3
Limit:	The maximum measured power during the duration of the test shall not exceed -30 dBm.
Test Frequency range:	1920MHz~1980MHz
Test procedure:	1. At the start of the test, the UE shall be switched off. The UE antenna connector shall be connected to a power measuring equipment, with the following characteristics: - the RF bandwidth shall exceed the total operating transmit frequency range of the UE for operation with an applicable part; - the response time of the power measuring equipment shall be such that the measured power has reached within 1 dB of its steady state value within 100 µs of a CW signal being applied; - it shall record the maximum power measured. 2. The UE shall be switched on for a period of approximately fifteen minutes, and then switched off. 3. The EUT shall remain switched off for a period of at least thirty seconds, and shall then be switched on for a period of approximately one minute. 4. The maximum power emitted from the UE throughout the duration of the test shall be recorded.
Test Instruments:	Refer to section 6.0

Measurement Data:

WCDMA Band 1				
Test Condition	Observed Frequency Range (MHz)	Maximum Measured Power (dBm)	Limit (dBm)	Result
Normal	1920 ~ 1980	-49.88	-30	Pass
WCDMA Band 8				
Test Condition	Observed Frequency Range (MHz)	Maximum Measured Power (dBm)	Limit (dBm)	Result
Normal	880 ~ 915	-50.21	-30	Pass

8 Test Setup Photo





9 EUT Constructional Details

Reference to the test report No. GTS201706000290E01

------End------