

SPECTRUM REPORT (GPRS)

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 Modem

Model No.: WL-D80

Applicable standards: ETSI EN 301 511 V12.5.1 (2017-03)

Date of sample receipt: June 27, 2017

Date of Test: June 28-July 04, 2017

Date of report issue: 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



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	July 05, 2017	Original

Prepared By:

Edward Pan

Date:

July 05, 2017

Project Engineer

Check By:

Andy Wu

Date:

July 05, 2017

Reviewer

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4 Test Summary

Radio Spectrum Matter (RSM) Part of Transmitter		
Test Item	Test require	Result
Transmitter – Frequency error and phase error	Clause 4.2.1	N/A
Transmitter – Frequency error under multi path and interference conditions	Clause 4.2.2	N/A
Transmitter output power and burst timing	Clause 4.2.5	N/A
Transmitter - Output RF spectrum	Clause 4.2.6	N/A
Frequency error and phase error in GPRS multislots configuration	Clause 4.2.4	N/A
Transmitter output power in GPRS multislots configuration	Clause 4.2.10	N/A
Output RF spectrum in GPRS multislots configuration	Clause 4.2.11	N/A
Frequency error and Modulation accuracy in EGPRS Configuration	Clause 4.2.26	N/A
Frequency error under multipath and interference conditions in EGPRS Configuration	Clause 4.2.27	N/A
EGPRS Transmitter output power	Clause 4.2.28	N/A
Output RF spectrum in EGPRS configuration	Clause 4.2.29	N/A
Conducted spurious emissions - MS allocated a channel	Clause 4.2.12	N/A
Conducted spurious emissions - MS in idle mode	Clause 4.2.13	N/A
Radiated spurious emissions - MS allocated a channel	Clause 4.2.16	Complied
Radiated spurious emissions - MS in idle mode	Clause 4.2.17	Complied
Radio Spectrum Matter (RSM) Part of Receiver		
Test Item	Test Method	Result
Receiver Blocking and spurious response -speech channels	Clause 4.2.20	N/A
Blocking and spurious response in EGPRS configuration	Clause 4.2.30	N/A
Intermodulation rejection - speech channels	Clause 4.2.32	N/A
Intermodulation rejection - EGPRS	Clause 4.2.34	N/A
AM suppression - speech channels	Clause 4.2.35	N/A
AM suppression - packet channels	Clause 4.2.37	N/A
Adjacent channel rejection - speech channels (TCH/FS)	Clause 4.2.38	N/A

Adjacent channel rejection - EGPRS	Clause 4.2.40	N/A
Reference sensitivity - TCH/FS	Clause 4.2.42	N/A
Reference sensitivity - FACCH/F	Clause 4.2.43	N/A
Minimum Input level for Reference Performance - GPRS	Clause 4.2.44	N/A
Minimum Input level for Reference Performance - EGPRS	Clause 4.2.45	N/A

5 General Information

5.1 General Description of EUT

Product Name:	Industrial Cellular Modem
Model No.:	WL-D80
Operation Frequency: (E-GSM900)	TX: 880---915MHz Rx: 925---960MHz
Operation Frequency: (DCS1800)	TX: 1710---1785MHz RX: 1805---1880MHz
Modulation Type:	GMSK
Antenna Type:	Integral Antenna
Antenna Gain:	1.0dBi(GSM900) 1.0dBi(DCS1800)
GPRS/EGPRS Type:	Class B
GPRS/EGPRS Class:	Class 12
Release Version:	R99
Power Supply:	Adapter Model No.: TS-A018-120015EJ Input: AC 100-240V, 50/60Hz, 0.5A Output: DC 12V, 1.5A

5.2 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.

5.3 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

5.4 Objective

The following type approved report of a radio equipment and system (RES) is prepared on behalf of the Shenzhen Telacom Science & Technology Co., Ltd in accordance with EN 301 511 V12.5.1 (2017-03), Global System for Mobile communications (GSM); Harmonized EN for mobile stations in the EGSM 900 and DCS1800 bands.

The objective of the manufacturer is to determine compliance with EN 301 511 12.5.1 (2017-03), Global System for Mobile communications (GSM); Harmonized EN for mobile stations in the GSM 900 and GSM 1800 bands.

In order to determine compliance, the manufacturer or a contracted laboratory makes measurements and takes the necessary steps to ensure that the equipment complies with the appropriate technical standards.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the immunity should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing and/or I/O cable changes, etc.)

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 System Test Configuration

7.1 Justification

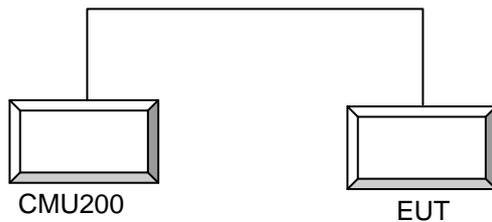
The EUT and test equipment were configured for testing according to EN 301 511 V12.5.1.

The EUT was tested in the normal operating mode to represent worst-case results during the final qualification test.

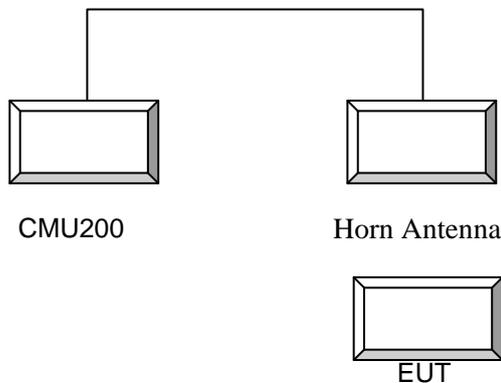
The EUT was tested with a dummy battery.

7.2 Test Setup

Conducted method



Radiated method



7.3 Environmental Conditions for Testing

General conditions (GC) as stated in TS 151 010-1 Annex 1 A1.1 apply.

Normal and extreme test conditions (TC) as stated in TS 151 010-1 Annex 1 A1.2 apply.

For extreme test conditions (TC2.2) the manufacturer declared the low voltage to 3.3 V (for Lithium-Ion battery). Higher extreme voltages/voltage of 4.2V.

If not other noted, the temperature was in range of +15°C to +35°C, the relative humidity was in the range of 20% to 95% and the DC power supply voltage was set to 3.7V (normal test conditions TC2.1).

Note: The relative humidity during all the tests is higher than the mentioned 20%-75% in TS 151 010-1 for test conditions. Since the weather situation in the testing area gives always this humidity level, all tests are performed within this range. No extra notification in the single test clauses is done.

Item	Normal condition	Extreme condition			
		HVHT	LVHT	HVLT	LVLT
Temperature	+15°C to + 35°C	+55°C	+55°C	-10°C	-10°C
Voltage	3.8V	4.2V	3.3V	4.2V	3.3V
Humidity	20%-95%				

7.4 Test channel

Channel	GSM 900		DCS 1800	
	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
Lowest channel	975	880.2	512	1710.2
Middle channel	60	836.6	700	1747.8
Highest channel	124	914.8	885	1784.8

8 Measurement Data and Measurement Result

8.1 Radiated Spurious Emissions-MS Allocated a Channel

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.16 and TS 151 010-1 clause 12.2.1

Limit

Frequency range	Power level in dBm	
	GSM900	DCS1800
30MHz to 1GHz	-36	-36
1GHz to 4GHz	-30	-
1GHz to 1710MHz	-	-30
1710MHz to 1785MHz	-	-36
1785MHz to 4GHz	-	-30

Test Procedure

- a. a) Initially the test antenna is closely coupled to the MS and any spurious emission radiated by the MS is detected by the test antenna and receiver in the range 30 MHz to 4 GHz.
NOTE 1: This is a qualitative step to identify the frequency and presence of spurious emissions which are to be measured in subsequent steps.
- b. The test antenna separation is set to the appropriate measurement distance and at each frequency at which a spurious emission has been detected the MS is rotated to obtain a maximum response. The effective radiated power of the emission is determined by a substitution measurement. In case of an anechoic shielded chamber pre-calibration may be used instead of a substitution measurement.
- c. The measurement bandwidth based on a 5 pole synchronously tuned filter shall be according to table 8. The power indication is the peak power detected by the measuring system.
The measurement time on any frequency shall be such that it includes the time during which the MS receives a TDMA frame containing the paging channel
NOTE 2: For these filter bandwidths some difficulties may be experienced with noise floor above required measurement limit. This will depend on the gain of the test antenna, and adjustment of the measuring system bandwidth is permissible. Alternatively, for test frequencies above 900 MHz, the test antenna separation from the MS may be reduced to 1 meter.
- d. The measurements are repeated with the test antenna in the orthogonal polarization plane.
- e. The test is repeated under extreme voltage test conditions (see [Annex 1, TC2.2]).

Frequency range	Frequency offset	Filter bandwidth	Approx video bandwidth
30MHz to 50MHz	-	10KHz	30KHz
50MHz to 500MHz	-	100KHz	300KHz
500MHz to 12.75GHz	0 to 10MHz	100KHz	300KHz
	≥10MHz	300KHz	1MHz
	≥20MHz	1MHz	3MHz
	≥30MHz	3MHz	3MHz

Test result

Complied

Have tested all kind of test conditions, all test results meet the standard requirement, so only show the test plots of normal condition in the report.

GSM 900 Band, Normal Voltage, Test channel 60				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
102.35	Vertical	-71.47	-36.00	Pass
657.41	V	-71.87	-36.00	
1804.00	V	-36.43	-30.00	
2707.00	V	-41.18	-30.00	
3415.00	V	-42.39	-30.00	
107.78	Horizontal	-71.89	-36.00	
971.87	H	-71.97	-36.00	
1804.00	H	-35.52	-30.00	
2707.00	H	-40.37	-30.00	
3610.00	H	-41.80	-30.00	

GSM 1800 Band: Normal Voltage, Test channel 700				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
130.46	Vertical	-64.65	-36.00	Pass
779.82	V	-68.19	-36.00	
1280.00	V	-49.94	-30.00	
2580.00	V	-50.88	-30.00	
3600.00	V	-51.84	-30.00	
66.84	Horizontal	-66.57	-36.00	
1011.44	H	-64.51	-36.00	
1280.00	H	-50.50	-30.00	
2580.00	H	-51.65	-30.00	
3600.00	H	-52.36	-30.00	

8.2 Radiated Spurious Emissions-MS in Idle Channel

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.17 and TS 151 010-1 clause 12.2.2

Limit

Frequency range	Limit (dBm)
9KHz to 880MHz	-57
880MHz to 915MHz	-59
915MHz to 1000MHz	-57
1GHz to 1710MHz	-47
1710MHz to 1785MHz	-53
1785MHz to 12.75GHz	-47

Test Procedure

- Initially the test antenna is closely coupled to the MS and any spurious emission radiated by the MS is detected by the test antenna and receiver in the range 30 MHz to 4 GHz.
NOTE 1: This is a qualitative step to identify the frequency and presence of spurious emissions which are to be measured in subsequent steps.
- The test antenna separation is set to the appropriate measurement distance and at each frequency at which a spurious emission has been detected the MS is rotated to obtain a maximum response. The effective radiated power of the emission is determined by a substitution measurement. In case of an anechoic shielded chamber pre-calibration may be used instead of a substitution measurement.
- The measurement bandwidth based on a 5 pole synchronously tuned filter shall be according to table 8. The power indication is the peak power detected by the measuring system.
The measurement time on any frequency shall be such that it includes the time during which the MS receives a TDMA frame containing the paging channel
NOTE 2: For these filter bandwidths some difficulties may be experienced with noise floor above required measurement limit. This will depend on the gain of the test antenna, and adjustment of the measuring system bandwidth is permissible. Alternatively, for test frequencies above 900 MHz, the test antenna separation from the MS may be reduced to 1 meter.
- The measurements are repeated with the test antenna in the orthogonal polarization plane.
- The test is repeated under extreme voltage test conditions (see [Annex 1, TC2.2]).

Frequency range	Filter bandwidth	Video bandwidth
100KHz to 50MHz	10KHz	30KHz
50MHz to 12.75GHz	100KHz	300KHz

Test result

Complied

Have tested all kind of test conditions, all test results meet the standard requirement, so only show the test plots of normal condition in the report.

Traffic mode:

GSM 900 Band, Normal Voltage, Test channel 60				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
105.21	Vertical	-67.23	-57.00	Pass
829.25	V	-68.40	-57.00	
1804.00	V	-53.87	-47.00	
2706.00	V	-54.98	-47.00	
3608.00	V	-55.77	-47.00	
99.02	Horizontal	-67.54	-57.00	
581.45	H	-68.36	-57.00	
1804.00	H	-54.20	-47.00	
2706.00	H	-55.84	-47.00	
3608.00	H	-56.06	-47.00	

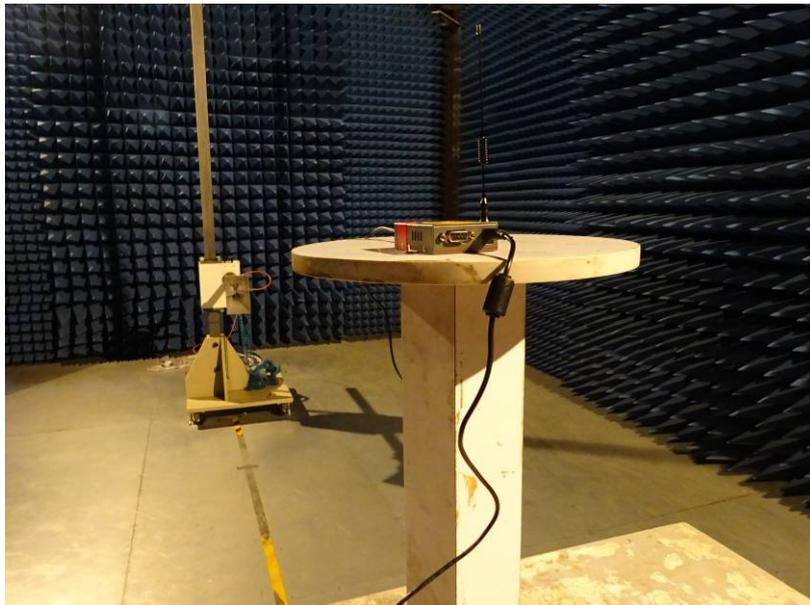
GSM 1800 Band: Normal Voltage, Test channel 700				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
42.89	Vertical	-70.88	-57.00	Pass
652.98	V	-69.87	-57.00	
1336.00	V	-67.45	-47.00	
2548.00	V	-57.60	-47.00	
3495.00	V	-56.34	-47.00	
103.09	Horizontal	-71.86	-57.00	
894.70	H	-69.61	-59.00	
1574.00	H	-68.17	-47.00	
2548.00	H	-58.37	-47.00	
3495.00	H	-57.35	-47.00	

Idle mode:

GSM 900 Band, Normal Voltage, Test channel 60				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
143.09	Vertical	-67.24	-57.00	Pass
717.48	V	-67.57	-57.00	
839.16	V	-68.41	-57.00	
1804.00	V	-53.89	-47.00	
2706.00	V	-54.99	-47.00	
139.75	Horizontal	-67.55	-57.00	
613.92	H	-68.37	-57.00	
1484.10	H	-69.28	-57.00	
1804.00	H	-54.21	-47.00	
2706.00	H	-55.85	-47.00	

GSM 1800 Band: Normal Voltage, Test channel 700				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
80.77	Vertical	-70.89	-57.00	Pass
699.41	V	-69.88	-57.00	
876.24	V	-68.69	-57.00	
1336.00	V	-67.47	-47.00	
2548.00	V	-57.61	-47.00	
143.82	Horizontal	-71.87	-57.00	
658.07	H	-70.48	-57.00	
905.10	H	-69.62	-59.00	
1574.00	H	-68.18	-47.00	
2548.00	H	-58.38	-47.00	

9 Test Setup Photo



10 EUT Constructional Details

Reference to the test report No. GTS201706000289E01

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