

ETSI EN 301 908-1 V13.1.1 (2019-11)  
ETSI EN 301 908-2 V11.1.2 (2017-08)

## TEST REPORT

For

### **Xiamen Milesight IoT Co., Ltd.**

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**Tested Model: UG65-L00E-868M-EA**  
**Multiple Models: UG65-L00E-868M,**  
**UG65-868M-EA, UG65-868M,**  
**UG65-L04EU-868M-EA, UG65-L04EU-868M**

<b>Report Type:</b> Original Report	<b>Product Type:</b> LoRaWAN Gateway
<b>Report Number:</b>	RXM200911053-22C
<b>Report Date:</b>	2020-12-30 Nancy Wang
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## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

Product	LoRaWAN Gateway
Tested Model	UG65-L00E-868M-EA
Multiple Models	UG65-L00E-868M, UG65-868M-EA, UG65-868M, UG65-L04EU-868M-EA, UG65-L04EU-868M
Model Differences	Refer to the DoS letter
Frequency Range	WCDMA2100: 1920-1980 MHz (TX), 2110-2170 MHz (RX) WCDMA900: 880-915 MHz (TX), 925-960 MHz (RX)
Transmit Power	WCDMA900: 23.63dBm WCDMA 2100: 23.47dBm
Modulation Technique	WCDMA: BPSK, QPSK, 16QAM, 64QAM
Voltage Range	DC 12.0V from adapter or DC 48V from POE
Date of Test	2020-10-11 to 2020-11-03
Sample serial number	RXM200911053-RF-S1 (Assigned by BAACL, Shenzhen)
Received date	2020-09-11
Sample/EUT Status	Good condition
Adapter information	Model: OH-1015A1201000U3-VDE Input: AC 100-240V, 50/60Hz, 0.35A Output: DC 12.0V, 1.0 A, 12.0W

### Objective

This test report is in accordance with ETSI EN 301 908-1 V13.1.1 (2019-11), IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 1: Introduction and common requirements and ETSI EN 301 908-2 V11.1.2 (2017-08), IMT cellular networks; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU; Part 2: CDMA Direct Spread (UTRA FDD) User Equipment (UE)

The objective is to determine compliance with ETSI EN 301 908-1 V13.1.1 (2019-11) and ETSI EN 301 908-2 V11.1.2 (2017-08).

### Test Methodology

All measurements contained in this report were conducted with ETSI EN 301 908-1 V13.1.1 (2019-11) and ETSI EN 301 908-2 V11.1.2 (2017-08).

## Measurement Uncertainty

According to the requirements of ETSI EN 301 908-1 and ETSI EN 301 908-2,  $F_{lab}$  (the value of the measurement uncertainty according to the requirements of ETSI TR 100 028) shall be, for each measurement, equal to or lower than the figure in the following table:

Item	Parameter	$F_{lab}$	Maximum allowable uncertainty
1	ERP 30MHz-180MHz	$\pm 3.62$ dB	$\pm 6$ dB
2	ERP 180MHz-12750MHz	$\pm 2.6$ dB	$\pm 3$ dB
3	Transmitter maximum output power	$\pm 0.73$ dB*	$\pm 0,7$ dB
4	Transmitter spectrum emissions mask	$\pm 1,6$ dB*	$\pm 1,5$ dB
5	Transmitter spurious emissions $f \leq 2.2$ GHz	$\pm 1.6$ dB*	$\pm 1,5$ dB
6	Transmitter spurious emissions $2.2$ GHz $< f \leq 4$ GHz	$\pm 1.6$ dB	$\pm 2,0$ dB
7	Transmitter spurious emissions $f > 4$ GHz	$\pm 1.6$ dB	$\pm 4,0$ dB
8	Transmitter spurious emissions $4$ GHz $< f \leq 12,75$ GHz	$\pm 1.6$ dB	$\pm 4,0$ dB
9	Transmitter spurious emissions Co-existence band ( $\geq -60$ dBm)	$\pm 1.6$ dB	$\pm 2,0$ dB
10	Transmitter spurious emissions Co-existence band ( $< -60$ dBm)	$\pm 2.5$ dB	$\pm 3,0$ dB
11	Transmitter Minimum output power	$\pm 0.73$ dB	$\pm 1,0$ dB
12	Receiver Adjacent Channel Selectivity (ACS)	$\pm 2.8$ dB*	$\pm 1,1$ dB
13	Receiver Blocking characteristics $f < 15$ MHz offset	$\pm 1.5$ dB*	$\pm 1,4$ dB
14	Receiver Blocking characteristics $15$ MHz offset $\leq f \leq 2.2$ GHz	$\pm 1.5$ dB*	$\pm 1,0$ dB
15	Receiver Blocking characteristics $2.2$ GHz $< f \leq 4$ GHz	$\pm 1.5$ dB	$\pm 1,7$ dB
16	Receiver Blocking characteristics $f > 4$ GHz	$\pm 3.3$ dB*	$\pm 3,1$ dB
17	Receiver spurious response $f \leq 2.2$ GHz	$\pm 1.5$ dB*	$\pm 1,0$ dB
18	Receiver spurious response $2.2$ GHz $< f \leq 4$ GHz	$\pm 1.5$ dB	$\pm 1,7$ dB
19	Receiver spurious response $f > 4$ GHz	$\pm 3.3$ dB*	$\pm 3,1$ dB
20	Receiver intermodulation characteristics	$\pm 1.3$ dB	$\pm 1,3$ dB
21	Receiver spurious emissions UE receive band ( $-60$ dBm)	$\pm 2.5$ dB	$\pm 3,0$ dB
22	Receiver spurious emissions UE transmit band ( $-60$ dBm)	$\pm 2.5$ dB	$\pm 3,0$ dB
23	Receiver spurious emissions $f \leq 2.2$ GHz	$\pm 1.6$ dB	$\pm 2,0$ dB
24	Receiver spurious emissions $2.2$ GHz $< f \leq 4$ GHz	$\pm 1.6$ dB	$\pm 2,0$ dB
25	Receiver spurious emissions $f > 4$ GHz	$\pm 1.6$ dB	$\pm 4,0$ dB
26	Out of synchronization of handling power DPCCH Ec/lor	$\pm 0.4$ dB	$\pm 0,4$ dB
27	Out of synchronization of handling power Transmit OFF power	$\pm 1.0$ dB	$\pm 1,0$ dB
28	Transmitter adjacent channel leakage power ratio	$\pm 0.8$ dB	$\pm 0,8$ dB

Note: \* Test system of laboratory have a measurement uncertainty greater than that specified in harmonized standard, this equipment can still be used provided that an adjustment is made follows: any additional uncertainty in the test system over and above that specified in harmonized standard should be used to tighten the test requirements - making the test harder to pass (for some tests, e.g. receiver tests, this may require modification of stimulus signals). This procedure will ensure that a test system not compliant with harmonized standard does not increase the probability of passing a EUT that would otherwise have failed a test if a test system compliant with harmonized standard had been used.

*Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor  $K$  with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.*

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## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

The system was configured for testing according to ETSI EN 301 908-1 V13.1.1 (2019-11), ETSI EN 301 908-2 V11.1.2 (2017-08).

### EUT Exercise Software

No exercise software.

### Special Accessories

No special accessory.

### Equipment Modifications

No modifications were made to the EUT.

### Support Equipment List and Details

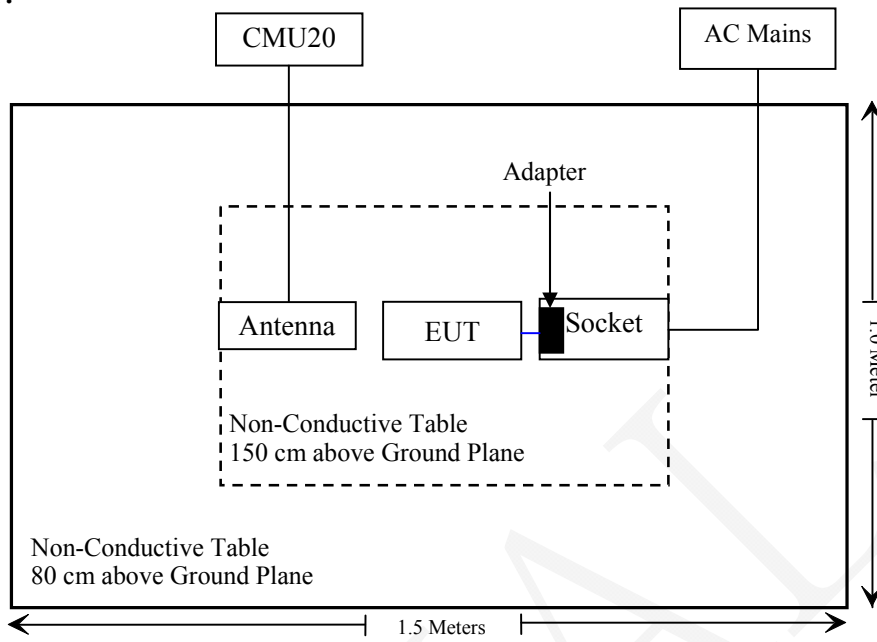
Manufacturer	Description	Model	Serial Number
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	106891
SHENZHEN GOSPELL DIGITAL TECHNOLOGY CO.,LTD.	POE	G0720-480-050	G0720-480-050

### External I/O Cable

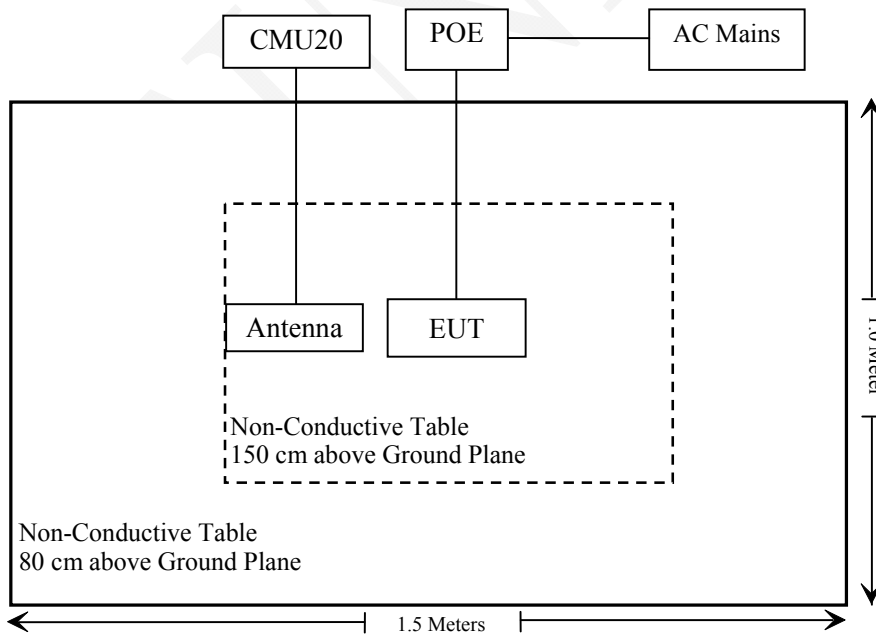
Cable Description	Length (m)	From/Port	To
Un-shielding Un-Detachable AC Cable	1.0	Socket	AC Mains
Un-shielding Un-Detachable DC Cable	2.5	Adapter	EUT
Un-shielding Detachable AC Cable	1.2	POE	AC Mains
Un-shielding Detachable RJ45 Cable	3.0	POE	EUT

**Block Diagram of Test Setup**

**For Adapter:**



**For POE:**



## SUMMARY OF TEST RESULTS

ETSI EN 301 908-1 V13.1.1	Description of Test	Test Result
§4.2.2	Radiated emissions (UE)	Compliance
§4.2.3	Radiated emissions (BS and repeater)	Not Applicable
§4.2.4	Control and monitoring functions (UE)	Compliance*

ETSI EN 301 908-2 V11.1.2	Description of Test	Test Result
§4.2.2	Transmitter maximum output power	Compliance*
§4.2.3	Transmitter spectrum emission mask	Compliance*
§4.2.4	Transmitter spurious emissions	Compliance*
§4.2.5	Transmitter minimum output power	Compliance*
§4.2.6	Receiver Adjacent Channel Selectivity (ACS)	Compliance*
§4.2.7	Receiver blocking characteristics	Compliance*
§4.2.8	Receiver spurious response	Compliance*
§4.2.9	Receiver intermodulation characteristics	Compliance*
§4.2.10	Receiver spurious emissions	Compliance*
§4.2.11	Out-of-synchronization handling of output power	Compliance*
§4.2.12	Transmitter Adjacent Channel Leakage power Ratio (ACLR)	Compliance*
§4.2.13	Receiver Reference Sensitivity level	Compliance*

**Note:** Compliance\*: The EUT has a certified LTE module (Model: EC25-EC). The related test items can refer to the module report: R1805A0247-R2, which was issued by TA Technology (Shanghai) Co., Ltd. on 07-03-2018.



**TEST EQUIPMENT LIST**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
<b>Radiated Emission Test</b>					
R&S	EMI Test Receiver	ESR3	102455	2020/08/04	2021/08/03
Sonoma instrument	Pre-amplifier	310 N	186238	2020/08/04	2021/08/03
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017/12/22	2020/12/21
COM-POWER	Dipole Antenna	AD-100	721027	NCR	NCR
Unknown	Cable 2	RF Cable 2	F-03-EM197	2019/11/29	2020/11/28
Unknown	Cable	Chamber Cable 1	F-03-EM236	2019/11/29	2020/11/28
Rohde & Schwarz	Spectrum Analyzer	FSV40-N	102259	2020/08/04	2021/08/03
COM-POWER	Pre-amplifier	PA-122	181919	2019/11/29	2020/11/28
Sunol Sciences	Horn Antenna	DRH-118	A052604	2017/12/22	2020/12/21
A.H.System	Horn Antenna	SAS-200/571	135	2018/09/01	2021/08/31
Insulated Wire Inc.	RF Cable	SPS-2503-3150	02222010	2019/11/29	2020/11/28
Unknown	RF Cable	W1101-EQ1 OUT	F-19-EM005	2019/11/29	2020/11/28
MICRO-TRONICS	Passband filter	HPM50111	F-19-EM006	2020/04/20	2021/04/19
Unknown	High Pass filter	1.3GHz	101120	2020/04/20	2021/04/19
Agilent	Signal Generator	N5183A	MY51040755	2019/12/04	2020/12/03
R&S	Wideband Radio Communication tester	CMW500	146520	2020/09/12	2021/09/11

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

**ETSI EN 301 908-1 V13.1.1 (2019-11) §4.2.2 – RADIATED EMISSIONS (UE)**

**Applicable Standard**

Limits

The frequency boundary and reference bandwidths for the detailed transitions of the limits between the requirements for out-of-band emissions and spurious emissions are based on Recommendations ITU-R SM.329-12 [1] and SM.1539-1 [i.6].

The requirements shown in table 4.2.2.2-1 are only applicable for frequencies in the spurious domain.

**Table 4.2.2.2-1: Radiated spurious emissions requirements (UE)**

Frequency	Minimum requirement (e.r.p.)/ reference bandwidth idle mode	Minimum requirement (e.r.p.)/ reference bandwidth traffic mode	Applicability
$30 \text{ MHz} \leq f < 1\,000 \text{ MHz}$	-57 dBm/100 kHz	-36 dBm/100 kHz	All
$1 \text{ GHz} \leq f < 12,75 \text{ GHz}$	-47 dBm/1 MHz	-30 dBm/1 MHz	All
$f_c - 2,5 \times 5 \text{ MHz} < f < f_c + 2,5 \times 5 \text{ MHz}$ (note 2)		Not defined	UTRA FDD, UTRA TDD, 3,84 Mcps option, cdma2000, spreading rate 3
$f_c - 2,5 \times BW_{\text{Channel}} \text{ MHz} < f < f_c + 2,5 \times BW_{\text{Channel}} \text{ MHz}$ (note 2)		Not defined	E-UTRA FDD, E-UTRA TDD, Mobile WiMAX™
$f_c - 2,5 \times 10 \text{ MHz} < f < f_c + 2,5 \times 10 \text{ MHz}$ (note 2)		Not defined	UTRA TDD, 7,68 Mcps option
$f_c - 4 \text{ MHz} < f < f_c + 4 \text{ MHz}$ (note 2)		Not defined	UTRA TDD, 1,28 Mcps option cdma2000, spreading rate 1

NOTE 1:  $f_c$  is the UE transmit centre frequency.  
NOTE 2: This frequency range is not in the spurious domain, no requirement is then defined for this frequency range.

**Test Results Summary**

According to the recorded data in following table, the EUT complied with the ETSI EN 301 908-1 V13.1.1 (2019-11).

**Test Data**

**Environmental Conditions**

<b>Temperature:</b>	28~31.7 °C
<b>Relative Humidity:</b>	54~58 %
<b>ATM Pressure:</b>	100.9~101.0 kPa

*The testing was performed by Holland Yang on 2020-10-11 for below 1GHz and Alan He on 2020-11-03 for above 1GHz.*

*EUT operation mode: Transmitting*

**Test Result: Pass**

Please refer to following data tables.

WCDMA2100 (Pre-test with low, middle, high channel, the worst case as below)

**Idle Mode**

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	EN 301 908-1	
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)		Limit (dBm)	Margin (dB)
<b>Below 1GHz: For Adapter</b>										
216.0	37.58	359	1.5	H	-62.5	0.57	0.0	-63.07	-57	6.07
216.0	38.49	212	1.3	V	-60.8	0.57	0.0	-61.37	-57	4.37
<b>Below 1GHz: For POE</b>										
215.9	37.63	172	2.2	H	-62.4	0.57	0.0	-62.97	-57	5.97
215.9	38.55	120	2.0	V	-60.7	0.57	0.0	-61.27	-57	4.27
<b>Above 1GHz</b>										
1512.24	41.80	298	1.2	H	-66.9	1.60	8.50	-60.00	-47	13.00
1512.24	41.73	143	2.1	V	-67.2	1.60	8.50	-60.30	-47	13.30

**Traffic Mode**

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	EN 301 908-1	
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)		Limit (dBm)	Margin (dB)
<b>Below 1GHz:For Adapter</b>										
215.9	37.54	293	2.2	H	-62.5	0.57	0.0	-63.07	-36	27.07
215.9	38.46	4	2.3	V	-60.9	0.57	0.0	-61.47	-36	25.47
<b>Below 1GHz:For POE</b>										
216.1	37.69	308	2.0	H	-62.4	0.57	0.0	-62.97	-36	26.97
216.1	38.42	99	1.7	V	-60.9	0.57	0.0	-61.47	-36	25.47
<b>Above 1GHz</b>										
3900.00	53.48	105	1.3	H	-47.6	1.60	11.90	-37.30	-30	7.30
3900.00	54.01	297	1.8	V	-46.9	1.60	11.90	-36.60	-30	6.60
5850.00	47.13	209	1.2	H	-52.6	1.70	12.20	-42.10	-30	12.10
5850.00	47.56	54	1.6	V	-51.6	1.70	12.20	-41.10	-30	11.10

WCDMA900 (Pre-test with low, middle, high channel, the worst case as below)

**Idle Mode**

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	EN 301 908-1	
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)		Limit (dBm)	Margin (dB)
<b>Below 1GHz: For Adapter</b>										
216.1	37.59	325	1.7	H	-62.5	0.57	0.0	-63.07	-57	6.07
216.1	38.66	9	1.2	V	-60.7	0.57	0.0	-61.27	-57	4.27
<b>Below 1GHz: For POE</b>										
216.1	37.56	201	2.2	H	-62.5	0.57	0.0	-63.07	-57	6.07
216.1	38.63	297	1.0	V	-60.7	0.57	0.0	-61.27	-57	4.27
<b>Above 1GHz</b>										
1534.55	42.72	61	2.0	H	-65.9	1.60	8.50	-59.00	-47	12.00
1534.55	42.84	328	2.2	V	-66.1	1.60	8.50	-59.20	-47	12.20

**Traffic Mode**

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	EN 301 908-1	
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)		Limit (dBm)	Margin (dB)
<b>Below 1GHz:For Adapter</b>										
216.1	37.61	319	1.7	H	-62.4	0.57	0.0	-62.97	-36	26.97
216.1	38.58	28	2.5	V	-60.7	0.57	0.0	-61.27	-36	25.27
<b>Below 1GHz:For POE</b>										
215.9	37.58	169	2.3	H	-62.5	0.57	0.0	-63.07	-36	27.07
215.9	38.61	47	1.9	V	-60.7	0.57	0.0	-61.27	-36	25.27
<b>Above 1GHz</b>										
1795.20	54.08	43	1.9	H	-50.9	1.30	9.30	-42.90	-30	12.90
1795.20	51.02	240	2.2	V	-53.6	1.30	9.30	-45.60	-30	15.60

**Note 1:** The unit of antenna gain is dBd for frequency below 1GHz and is dBi for frequency above 1GHz.**Note 2:**

Absolute Level = SG Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level

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## **EXHIBIT A - EUT PHOTOGRAPHS**

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Please refer to the Attachment.

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## EXHIBIT B - TEST SETUP PHOTOGRAPHS

**Radiated Spurious Emissions Test View (Below 1GHz, For Adapter)**



**Radiated Spurious Emissions Test View (Below 1GHz, For POE)**



**Radiated Spurious Emissions Test View (Above 1GHz)**



**\*\*\*\*\* END OF REPORT \*\*\*\*\***