



Full

TEST REPORT

No. I17D00197-SRD05

For

Client : Gemalto M2M GmbH

Production : LTE Data-Only SMT World-Module

Model Name : ELS81-US

FCC ID: QIPELS81-US

Hardware Version: B2.1

Software Version: 02.000

Issued date: 2017-07-09

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of ECIT Shanghai.

Test Laboratory:

ECIT Shanghai, East China Institute of Telecommunications

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Revision Version

Report Number	Revision	Date	Memo
I17D00197-SRD05	00	2017-07-09	Initial creation of test report

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1. Test Laboratory

1.1. Testing Location

Company Name:	ECIT Shanghai, East China Institute of Telecommunications
Address:	7-8F, G Area, No. 668, Beijing East Road, Huangpu District, Shanghai, P. R. China
Postal Code:	200001
Telephone:	(+86)-021-63843300
Fax:	(+86)-021-63843301
FCC Registration NO.:	489729

1.2. Testing Environment

Normal Temperature:	15-35°C
Extreme Temperature:	-10/+55°C
Relative Humidity:	20-75%

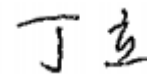
1.3. Project data

Project Leader:	Zhou Yan
Testing Start Date:	2015-11-17
Testing End Date:	2015-11-28
Testing Start Date:	2017-07-02 (N03,N02 for RSE)
Testing End Date:	2017-07-06 (N03,N02 for RSE)

1.4. Signature



Yang Dejun
(Prepared this test report)



Ding Li
(Reviewed this test report)



Zheng Zhongbin
Director of the laboratory
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name: Gemalto M2M GmbH
Address: Gemalto M2M GmbH, Siemensdamm 50, 13629 Berlin, Germany
Email: Qiang.sun@gemalto.com
Postcode: 13629

2.2. Manufacturer Information

Company Name: Gemalto M2M GmbH
Address: Gemalto M2M GmbH, Siemensdamm 50, 13629 Berlin, Germany
Email: Qiang.sun@gemalto.com
Postcode: 13629

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

EUT Description	LTE Data-Only SMT World-Module
Model name	ELS81-US
FCC ID	QIPELS81-US
Frequency	WCDMA Band II/IV/V LTE FDD2/4/5/12
Extreme Temperature	-10/+55°C
Nominal Voltage	3.8V
Extreme High Voltage	4.5V
Extreme Low Voltage	3.0V

Note: Photographs of EUT are shown in ANNEX A of this test report.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt
N02	N/A	B2.1	02.000	2017-09-01
N03	N/A	B2.1	02.000	2017-09-01

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

AE ID*	Description	SN
AE1	RF cable	---
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*AE ID: is used to identify the test sample in the lab internally.

3.4. Statements

The product name ELS81-US, supporting WCDMA/HSDPA/HSUPA/HSPA+/LTE, manufactured by Gemalto M2M GmbH. is a variant product for testing. According to the variant description, All the test results please refer to UL05420151102FCC/IC042-1 except the worse case of Band5'RSE and Band4'RSE

ECIT has verified that the compliance of the tested device specified in section 5 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 5 of this test report.

4. Reference Documents

4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	2014
FCC Part 22	PUBLIC MOBILE SERVICES	2014
ANSI-TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2016
ANSI C63.4	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2014

5. SUMMARY OF TEST RESULTS

Item	Test items	FCC rules	IC rules	result
1	Output Power	2.1046/22.913(a)/24.232(c)	RSS-132 5.4/ RSS-133 6.4	N/A
2	Peak-to-Average Ratio	24.232(d)	RSS-132 5.4/ RSS-133 6.4	N/A
3	99%Occupied Bandwidth	2.1049(h)(i)/ 22.917(b)	RSS-Gen 4.6	N/A
4	-26dB Emission Bandwidth	22.917(b)/§24.238(b)	RSS-Gen 4.6	N/A
5	Band Edge at antenna terminals	22.917(a)/24.238(a)	RSS-132 5.5/ RSS-133 6.5	N/A
6	Frequency stability	2.1055/24.235	RSS-132 5.3/ RSS-133 6.3	N/A
7	Conducted Spurious mission	2.1053/22.917(a)/24.238(a)	RSS-132 5.5/ RSS-133 6.5	N/A
8	Emission Limit	2.1051/22.917/24.238/22.9 13/24.232	RSS-132 5.5/ RSS-133 6.5	Pass

6. Test Equipment Utilized

Climate chamber

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Cal.interval
1	Climate chamber	SH-641	92012011	ESPEC	2016-01-06	2 Year

Radiated emission test system

The test equipment and ancillaries used are as follows.

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Cal.interval
1	Universal Radio Communication Tester	CMU200	123123	R&S	2017-05-11	1 Year
2	EMI Test Receiver	ESU40	100307	R&S	2017-05-11	1 Year
3	TRILOG Broadband Antenna	VULB9163	VULB9163-515	Schwarzbeck	2017-02-25	3 Year
4	Double-ridged Waveguide Antenna	ETS-3117	00135890	ETS	2017-01-11	3 Year
5	2-Line V-Network	ENV216	101380	R&S	2017-05-11	1 Year
6	Substitution Antenna	ETS-3117	00135890	ETS	2017-01-11	3 Year
7	RF Signal Generator	SMF100A	102314	R&S	2017-05-11	1 Year
8	Substitution Antenna	VUBA9117	9117-266	Schwarzbeck	2017-08-18	3 Year
9	Amplifier	SCU03	10009	R&S	2017-01-05	1 Year

10	Amplifier	NTWPA -008610 F	12023024	Rflight	2017-01-05	1 Year
11	Attenuators	BW-N3 W5+	/	MCL	2017-01-05	1 Year

Conducted test system

No.	Name	Type	SN	Manufacture	Calibration date	Cal.interval
1	Spectrum Analyzer	FSQ26	101096	R&S	2017-05-11	1 Year
2	Universal Radio Communicat	CMU200	123102	R&S	2017-05-11	1 Year
3	DC Power Supply	ZUP60-1 4	LOC-220Z006 -0007	TDL-Lambda	2017-05-11	1 Year

7. Test Environment

Shielding Room1 (6.0 meters×3.0 meters×2.7 meters) did not exceed following limits along the conducted RF performance testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Ground system resistance	< 0.5 Ω

Control room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. =25 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω

Fully-anechoic chamber1 (6.9 meters×10.9 meters×5.4 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 25 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
VSWR	Between 0 and 6 dB, from 1GHz to 18GHz
Site Attenuation Deviation	Between -4 and 4 dB,30MHz to 1GHz
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

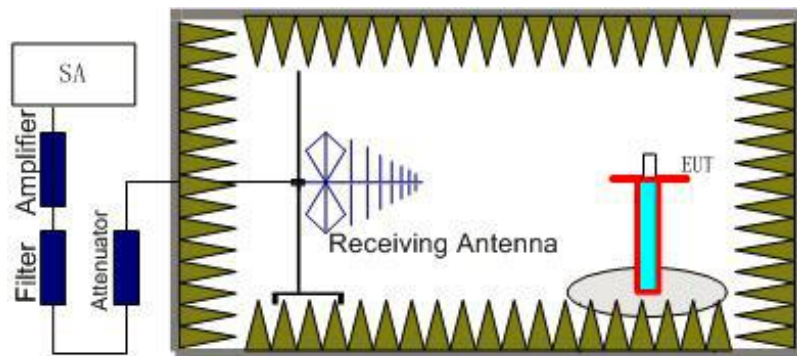
ANNEX A. MEASUREMENT RESULTS

A.1 RSE

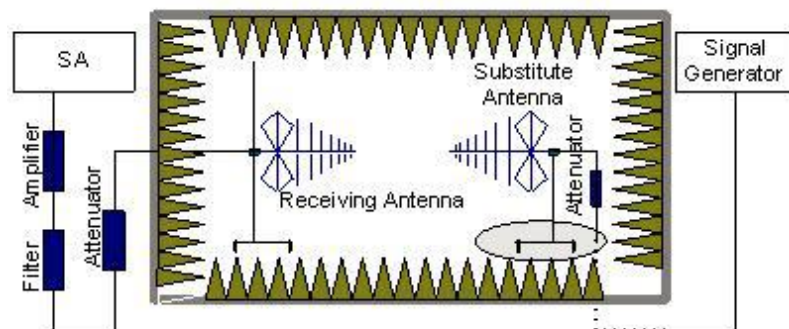
A.1.1 EMISSION LIMIT (§2.1051/§22.917§24.238)

A.1.1.1 The procedure of radiated spurious emissions is as follows:

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (P_r).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. The Path loss (P_{pl}) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain (G_a) should be recorded after test.

A amplifier should be connected in for the test.

The Path loss (P_{pl}) is the summation of the cable loss .

The measurement results are obtained as described below:

$$\text{Power(EIRP)} = P_{\text{Mea}} - P_{\text{pl}} + G_a$$

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.

6. ERP can be calculated from EIRP by subtracting the gain of the dipole, $\text{ERP} = \text{EIRP} - 2.15\text{dBi}$

A.1.1.2. WCDMA Measurement Method

The measurements procedures in TIA-603E-2016 are used.

The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment. The resolution bandwidth is set as outlined in Part 24.238 and Part 24.917.

The spectrum is scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of WCDMA Band IV and WCDMA Band V.

The procedure of radiated spurious emissions is the same like GSM.

A.1.1.2.1. Measurement Limit

Part 24.238 and Part 22.917 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

The specification that emissions shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

A.1.1.2.2. Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the WCDMA Band V (826.4MHz, 836.6MHz and 846.6MHz) . It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the WCDMA Band V into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

Note: We only test the worse case

A.1.1.2.3. Measurement Results Table

Frequency	Channel	Frequency Range	Result
WCDMA Band IV	Low	30MHz~20GHz	P

	Middle	30MHz~20GHz	P
	High	30MHz~20GHz	P
WCDMA Band V	Low	30MHz~20GHz	P
	Middle	30MHz~20GHz	P
	High	30MHz~20GHz	P

WCDMA BAND IV Mode Channel 1312

Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3423.6	-59.17	6.3	5.7	-59.77	-13	V
5082	-60.26	7.9	8.9	-59.26	-13	H
7241.6	-60.66	9.6	13.7	-56.56	-13	H
9340.8	-61.91	10.7	18.5	-54.11	-13	V
13204.65	-56.86	13	21.5	-48.36	-13	H
17207.25	-47.2	16	19.8	-43.4	-13	H

WCDMA BAND IV Mode Channel 1413

Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3466.8	-59.14	6.4	5.8	-59.74	-13	V
5777.6	-60.19	8.4	10.5	-58.09	-13	V
8638.4	-63.79	10.3	18.4	-55.69	-13	H
10724.4	-56.45	11.7	17.3	-50.85	-13	H

13395.75	-56.94	13.7	22.8	-47.84	-13	H
17198.85	-47.39	16	19.8	-43.59	-13	V

WCDMA BAND IV Mode Channel 1513
Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3503.2	-58.54	6.4	6	-58.94	-13	V
5785.6	-60.25	8.4	10.5	-58.15	-13	V
7648	-61.34	9.7	15	-56.04	-13	V
10764	-57.14	11.7	17.3	-51.54	-13	V
13375.8	-56.19	13.7	22.6	-47.29	-13	H
17185.2	-47.74	16	19.8	-43.94	-13	V

Conclusion: PASS

Note: the EUT was displayed in several different direction, the worst cases were shown.

WCDMA BAND V Mode Channel 4132
Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
2822.307692	-52.1	5.7	4.2	-53.6	-13	H
4470.4	-58.3	7.3	7.4	-58.2	-13	V
5554	-59.6	8.2	9.7	-58.1	-13	V
6660	-59.88	9.1	12	-56.98	-13	H

8084.8	-62.52	9.9	16.8	-55.62	-13	V
9866.2	-58.84	11	17.9	-51.94	-13	H

WCDMA BAND V Mode Channel 4183
Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3782	-61.04	6.7	6.3	-61.44	-13	V
4536	-59.36	7.4	7.4	-59.36	-13	H
5261.2	-59.43	8	8.7	-58.73	-13	V
6350.8	-59.08	8.8	11.1	-56.78	-13	V
7736.8	-62.2	9.8	15.3	-56.7	-13	V
9786.4	-59.93	11	18	-52.93	-13	H

WCDMA BAND V Mode Channel 4233
Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
1695	-54.94	4.4	3	-56.34	-13	V
4506.8	-57.89	7.3	7.3	-57.89	-13	H
5282.4	-58.53	8	8.8	-57.73	-13	H
7062.4	-60.26	9.4	13	-56.66	-13	V
7846.6	-61.72	9.9	15.8	-55.82	-13	V
9783.4	-60.57	11	18	-53.57	-13	H

Conclusion: PASS

Note: the EUT was displayed in several different direction, the worst cases were shown.

ANNEX B. Deviations from Prescribed Test Methods

No deviation from Prescribed Test Methods.

*******End The Report*******