TEST REPORT

No. I17D00197-MPE01

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: **2017-10-11**

Test Laboratory:
ECIT Shanghai, East China Institute of Telecommunications
Add: 7F, G Area, No.668, Beijing East Road, Huangpu District, Shanghai, P. R. China
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Revision Version

Report Number	Revision	Date	Memo
I17D00197-MPE01	00	2017-09-30	Initial creation of test report
I17D00197-MPE01	01	2017-10-11	Second 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
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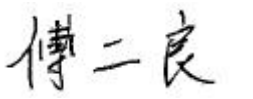
1.2. Project Data

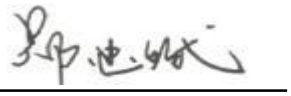
Project Leader:	ZhouYan

1.3. Signature



Fu Erliang
(Prepared this test report)

Song Kaihua
(Reviewed this test report)



Zheng Zhongbin
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name: Gemalto M2M GmbH
Address /Post: Gemalto M2M GmbH, Siemensdamm 50, 13629 Berlin, Germany
Telephone: +861059378342

2.2. Manufacturer Information

Company Name: Gemalto M2M GmbH
Address /Post: Gemalto M2M GmbH, Siemensdamm 50, 13629 Berlin, Germany
Telephone: +861059378342

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
WCDMA Frequency Band	WCDMA Band2/4/5
LTE Frequency Band	LTE Band2/4/5/12
Antenna Type	External Antenna
FCC ID:	QIPELS81-US

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version:
N01	N/A	B2.1	02.000

*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	Model	SN	Manufacturer
N/A	N/A	N/A	N/A	N/A

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

4. Reference Documents

4.1. Applicable Standards

The MPE report was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47 Part 2.1091.
FCC CFR 47, Part 2, FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
Section 1.1310 Radiofrequency radiation exposure limits

4.2. Test Limits

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

Limits for Occupational / Controlled Exposure

Frequency Range [MHz]	Electric Field Strength (E) [V/m]	Magnetic Field Strength (H) [A/m]	Power Density (S) [mW/cm2]	Averaging Times |E|2, |H|2 or S [miniutes]
0.3 – 3.0	614	1.63	(100)*	6
3.0 – 30	1824/f	4.89/f	(900/f)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	--	--	F/300	6
1500 - 100000	--	--	5	6

Limits for General Population / Uncontrolled Exposure

Frequency Range [MHz]	Electric Field Strength (E) [V/m]	Magnetic Field Strength (H) [A/m]	Power Density (S) [mW/cm2]	Averaging Times |E|2, |H|2 or S [miniutes]
0.3 – 1.34	614	1.63	(100)*	30
1.34 – 30	824/f	2.19/f	(180/f)*	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	--	--	F/1500	30
1500 - 100000	--	--	1.0	30

Note: f=frequency in MHz; *Plane-wave equivalent power density
For the DUT, the limits for General Population / Uncontrolled Exposure are applicable.

5. Test Results

5.1. RF Power Output

Frequency Band	Highest Power Output(dBm)	Antenna Gain(dBi)
WCDMA Band2	25	2.15
WCDMA Band4	25	2.15
WCDMA Band5	25	2.15
LTE Band2	25	2.15
LTE Band4	25	2.15
LTE Band5	25	2.15
LTE Band12	25	2.15

5.2. Calculation Information

For conservative evaluation consideration, only maximum power of each frequency band based on the tighter limits respectively are used to calculate the boundary power density.

Based on the FCC KDB 447498 D01 and 47 CFR §2.1091, the DUT is evaluated as a mobile device.

Given $S = \frac{P \times G}{4\Pi d^2}$ *Equation 1*

Where

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power density in milliwatts / square centimeter

5.3. Result of WCDMA Band2

Test Results: MPE Limit Calculation: the EUT's operating frequencies @ 1850 – 1910 MHz; as per the original test report the highest power is 316.23mW,. The maximum gain is 2.15dBi(numeric gain 1.641).The resulted power density at a distance of 20cm can be deducted as follows:

Power Density=P*G*Duty Cycle/(4 π R^2) =0.103 mW/cm^2

The MPE limit for Occupational/Controlled Exposure is shown in the FCC KDB 447498 D01 and 47 CFR §2.1091, can be calculated as follows:

MPE limit = 1 mW/cm^2

As we can see the resulted power density is below the MPE limit, therefore the DUT in this band is compliant with the FCC rules on RF exposure.

5.4. Result of WCDMA Band4

Test Results: MPE Limit Calculation: the EUT's operating frequencies @ 1710 – 1755 MHz; as per the original test report the highest power is 316.23 mW,. The maximum gain is 2.15 dBi(numeric gain 1.641).The resulted power density at a distance of 20cm can be deducted as follows:

Power Density=P*G*Duty Cycle/(4 π R^2) =0.103 mW/cm^2

The MPE limit for Occupational/Controlled Exposure is shown in the FCC KDB 447498 D01 and 47 CFR §2.1091, can be calculated as follows:

MPE limit = 1 mW/cm^2

As we can see the resulted power density is below the MPE limit, therefore the DUT in this band is compliant with the FCC rules on RF exposure.

5.5. Result of WCDMA Band5

Test Results: MPE Limit Calculation: the EUT's operating frequencies @ 824 – 849 MHz; as per the original test report the highest power is 316.23 mW,. The maximum gain is 2.15 dBi(numeric gain 1.641).The resulted power density at a distance of 20cm can be deducted as follows:

Power Density=P*G*Duty Cycle/(4 π R^2) =0.103 mW/cm^2

The MPE limit for Occupational/Controlled Exposure is shown in the FCC KDB 447498 D01 and 47 CFR §2.1091, can be calculated as follows:

MPE limit = 0.549 mW/cm^2

As we can see the resulted power density is below the MPE limit, therefore the DUT in this band is compliant with the FCC rules on RF exposure.

5.6. Result of LTE Band2

Test Results: MPE Limit Calculation: the EUT's operating frequencies @ 1850 – 1910 MHz; as per the original test report the highest power is 316.23mW,. The maximum gain is 2.15dBi(numeric gain 1.641).The resulted power density at a distance of 20cm can be deducted as follows:

Power Density=P*G*Duty Cycle/(4 π R^2) =0.103 mW/cm^2

The MPE limit for Occupational/Controlled Exposure is shown in the FCC KDB 447498 D01 and 47 CFR §2.1091, can be calculated as follows:

MPE limit = 1 mW/cm^2

As we can see the resulted power density is below the MPE limit, therefore the DUT in this band is compliant with the FCC rules on RF exposure.

5.7. Result of LTE Band4

Test Results: MPE Limit Calculation: the EUT's operating frequencies @ 1710 – 1755 MHz; as per the original test report the highest power is 316.23 mW,. The maximum gain is 2.15 dBi(numeric gain 1.641).The resulted power density at a distance of 20cm can be deducted as follows:

Power Density=P*G*Duty Cycle/(4 π R^2) =0.103 mW/cm^2

The MPE limit for Occupational/Controlled Exposure is shown in the FCC KDB 447498 D01 and 47 CFR §2.1091, can be calculated as follows:

MPE limit = 1 mW/cm^2

As we can see the resulted power density is below the MPE limit, therefore the DUT in this band is compliant with the FCC rules on RF exposure.

5.8. Result of LTE Band5

Test Results: MPE Limit Calculation: the EUT's operating frequencies @ 824 – 849 MHz; as per the original test report the highest power is 316.23 mW,. The maximum gain is 2.15 dBi(numeric gain 1.641).The resulted power density at a distance of 20cm can be deducted as follows:

Power Density=P*G*Duty Cycle/(4 π R^2) =0.103 mW/cm^2

The MPE limit for Occupational/Controlled Exposure is shown in the FCC KDB 447498 D01 and 47 CFR §2.1091, can be calculated as follows:

MPE limit = 0.549 mW/cm^2

As we can see the resulted power density is below the MPE limit, therefore the DUT in this band is compliant with the FCC rules on RF exposure.

5.9. Result of LTE Band12

Test Results: MPE Limit Calculation: the EUT's operating frequencies @ 698 – 716 MHz; as per the original test report the highest power is 316.23mW,. The maximum gain is 2.15dBi(numeric gain 1.641).The resulted power density at a distance of 20cm can

be deducted as follows:

Power Density=P*G*Duty Cycle/(4 π R^2)= 0.103 mW/cm^2

The MPE limit for Occupational/Controlled Exposure is shown in the FCC KDB 447498 D01 and 47 CFR §2.1091, can be calculated as follows:

MPE limit = F/1500=698/1500=0.465 mW/cm^2

As we can see the resulted power density is below the MPE limit, therefore the DUT in this band is compliant with the FCC rules on RF exposure.

Note: π=3.1416

So the product is under the MPE limits. All is pass.

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