



TEST REPORT

No. I20D00046-SAR01

For

Client : Gemalto M2M GmbH

Production : LTE Data-Only SMT World-Module

Model Name : PLS62-W

FCC ID: QIPPLS62-W

IC: 7830A-PLS62W

Hardware Version: B2.1

Software Version: 01.000

Issued date: 2020-04-08

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
I20D00046-SAR01	00	2020-04-08	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:	Building 4, No. 766, Jingang Road, Pudong, Shanghai, P.R. China
Postal Code:	201206
Telephone:	(+86)-021-63843300
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1.2. Project Data

Project Leader:	Zhou Yan
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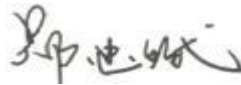
1.3. Signature



Wang Yubin
(Prepared this test report)



Yan Hang
(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
Postcode: /

2.2. Manufacturer Information

Company Name: Gemalto M2M GmbH
Address /Post: Gemalto M2M GmbH, Siemensdamm 50, 13629 Berlin, Germany
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Postcode: /

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

3.1. About EUT

EUT Description	LTE Data-Only SMT World-Module
Model name	PLS62-W
GSM Frequency Band	GSM850/1900
LTE Frequency Band	LTE Band2/4/5/7/12/18/19
Antenna Type	External Antenna
FCC ID:	QIPPLS62-W
IC:	7830A-PLS62W

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version:
N01	N/A	B2.1	01.000

*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. Power Output Test Results

4.1. RF Power Output

Frequency Band	Max power(dBm)
LTE Band2	25
LTE Band4	25
LTE Band5	25
LTE Band7	25
LTE Band12	25
LTE Band18	25
LTE Band19	25
GSM850	35
GSM1900	32
UMTS Band 2	25
UMTS Band 4	25
UMTS Band 5	25

5. Reference Documents for FCC

5.1. 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, Oct 1,2011

Section 2.1091 Radiofrequency radiation exposure evaluation: mobile devices, June 23, 2015

5.2. 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 [V/m]	Magnetic Field Strength (E) [A/m]	Magnetic Field Strength (H)	Power Density (S) [mW/cm ²]	Averaging Times E ² , H ² or S [minutes]
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 [V/m]	Magnetic Field Strength (E) [A/m]	Magnetic Field Strength (H)	Power Density (S) [mW/cm ²]	Averaging Times E ² , H ² or S [minutes]
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.

FCC: §1.1307	Cellular Radiotelephone Service (subpart H of part 22) Non-building-mounted antennas: height above ground level to lowest point of antenna < 10 m and total power of all channels > 1000 W ERP (1640 W EIRP)
FCC §1.1307	Personal Communications Services (part 24) Broadband PCS (subpart E): non-building-mounted antennas: height above ground level to lowest point of antenna < 10 m and total power of all channels > 2000 W ERP (3280 W EIRP)
FCC §1.1310	LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE) Table 1(B) Limits for General Population/Uncontrolled Exposure 300–1500 MHz: f/1500 mW/cm ² 1500–100,000 MHz: 1.0 mW/cm ² Subject to routine evaluation is required when the device operate at frequencies of 1.5 GHz or below and their
FCC §24.232	(c) Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.
FCC §22.913	(a) Maximum ERP. The effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.
FCC §27.50 (b)(10)	(10) Portable stations (hand-held devices) transmitting in the 746–757 MHz, 776–788 MHz, and 805–806 MHz bands are limited to 3 watts ERP.
FCC §27.50 (c)(10)	(10) Portable stations (hand-held devices) in the 600 MHz uplink band and the 698–746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.
FCC §27.50(d)	(4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band are limited to 1 watt EIRP.
FCC §90.635	(a) The effective radiated power and antenna height for base stations may not exceed 1 kilowatt (30 dBw) and 304 m. (1,000 ft.) above average terrain (AAT), respectively, or the equivalent thereof as determined from the Table These are maximum values, and applicants will be required to justify power levels and antenna heights requested. (b) The maximum output power of the transmitter for mobile stations is 100 watts (20 dBw).

5.3. 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.

$$\text{Given } S = \frac{P \times G}{4\pi d^2} \quad \text{Equation 1}$$

Where

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power density in milliwatts / square centimeter

5.4. Max. Antenna gain calculations

Maximum antenna gain considerations for fixed/mobile operations for complying with limits:

Band	Highest Output Power (dBm)	Limit mW/cm ²	Max antenna gain at 20cm(dBi)
LTE Band2	25	1	12.00
LTE Band4	25	1	12.00
LTE Band5	25	0.549	9.40
LTE Band7	25	1	12.00
LTE Band12	25	0.477	8.8
LTE Band18	25	0.543	9.35
LTE Band19	25	0.553	9.43
GSM850	35	0.549	-0.59
GSM1900	32	1	5.00
UMTS Band 2	25	1	12.00
UMTS Band 4	25	1	12.00
UMTS Band 5	25	0.549	9.40

Power limit according to §22.913; §27.50;§24.232 [W]:

Band	Highest Frame-Averaged Output Power (dBm)	Limit (W) EIRP	Max antenna gain (dBi)
LTE Band2	25	2.0	8.01
LTE Band4	25	1.0	5.00
LTE Band7	25	2.0	8.01
GSM1900	32	2.0	1.01
UMTS Band 2	25	2.0	8.01
UMTS Band 4	25	1.0	5.00
Band	Highest Frame-Averaged Output Power (dBm)	Limit (W) ERP	Max antenna gain (dBi)
LTE Band5	25	7.0	13.45

LTE Band12	25	3.0	9.77
LTE Band18	25	3.0	9.77
LTE Band19	25	3.0	9.77
GSM850	35	7.0	3.45
UMTS Band 5	25	7.0	13.45

5.5. Conclusion for maximum admissible antenna gain (FCC)

Band	Maximum admissible antenna gain (dBi)
LTE Band2	8.01
LTE Band4	5.00
LTE Band5	9.40
LTE Band7	8.01
LTE Band12	8.80
LTE Band18	9.35
LTE Band19	9.43
GSM850	-0.59
GSM1900	1.01
UMTS Band 2	8.01
UMTS Band 4	5.00
UMTS Band 5	9.4

Note: Using frequency in 815~849MHz allows the use of antenna gain biggest -0.59 dBi.

Using frequency in 1850~1910MHz;1710~1755MHz; 2500~2570 MHz allows the use of antenna gain biggest 1.01 dBi.

6. Reference Documents for IC

6.1. Applicable Standards

RSS 102 Issue 5 :Radio Frequency (RF) Exposure Compliance of Radio communication Apparatus (All Frequency Bands)

6.2. Test Limits

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p of the device is equal to or less than $22.48/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p was derived.

RSS 132	The transmitter output power shall be measured in terms of average power. The equivalent isotropically radiated power (e.i.r.p) for mobile equipment shall not exceed 11.5 watts. Refer to SRSP-503 for base station e.i.r.p limits.
RSS 133	The equivalent isotropically radiated power (e.i.r.p) for transmitters shall not exceed the limits given in SRSP-510.
RSS 139	The equivalent isotropically radiated power (e.i.r.p) for mobile and portable transmitters shall not exceed one watt. The e.i.r.p for fixed and base stations in the band 1710-1780 MHz shall not exceed one watt. Consult SRSP-513 for e.i.r.p limits on fixed and base stations operating in the band 2110-2180 MHz.
RSS 140	The equivalent radiated power (e.r.p) for control and mobile equipment shall not exceed 30 W. The e.r.p for portable equipment including handheld devices shall not exceed 3 W. Fixed and base station equipment shall comply with the e.r.p limits in SRSP-540.
SRSP-510	5.1.2 Mobile Stations Mobile stations and hand-held portables are limited to 2 watts maximum e.i.r.p The equipment shall employ means to limit the power to the minimum necessary for successful communication.
SRSP-513	For fixed and base stations operating within the frequency range 2110-2180 MHz with a channel bandwidth equal to or less than 1 MHz, the maximum permissible equivalent isotropically radiated power (e.i.r.p) is 1640 watts with an antenna height above average terrain (HAAT) 4 up to 300 metres.

6.3. Calculation Information

at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834} \text{ W}$ (adjusted for tune-up tolerance), where f is in MHz;

6.4. Result of LTE

The MPE limit for Occupational/Controlled Exposure is shown in the RSS 102 issue 5 section 2.5.2, can be calculated as follows:

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

6.5. Max. Antenna gain calculations

Maximum antenna gain considerations for fixed/mobile operations for complying with limits according to RSS 102:

Band	Highest Output Power (dBm)	MPE limit (W)	Max antenna gain at 20cm(dBi)
LTE Band2	25	2.24	8.50
LTE Band4	25	2.12	8.26
LTE Band5	25	1.29	6.11
LTE Band7	25	2.75	9.39
LTE Band12	25	1.15	5.61
LTE Band18	25	1.28	6.07
LTE Band19	25	1.29	6.11
GSM850	35	1.29	-3.89
GSM1900	32	2.24	1.50
UMTS Band 2	25	2.24	8.50
UMTS Band 4	25	2.12	8.26
UMTS Band 5	25	1.29	6.11

Power limit according to RSS 132; RSS 133; RSS 139; SRSP-510:

Band	Highest Output Power (dBm)	Limit (W) EIRP	Max antenna gain (dBi)
LTE Band2	25	2.0	8.01
LTE Band4	25	1.0	5.00
LTE Band5	25	11.5	15.61

LTE Band7	25	2.0	8.01
LTE Band12	25	11.5	15.61
LTE Band18	25	11.5	15.61
LTE Band19	25	11.5	15.61
GSM850	35	11.5	5.61
GSM1900	32	2.0	1.01
UMTS Band 2	25	2.0	8.01
UMTS Band 4	25	1.0	5.00
UMTS Band 5	25	11.5	15.61

6.6. Conclusion for maximum admissible antenna gain (IC)

Band	Maximum admissible antenna gain (dBi)
LTE Band2	8.01
LTE Band4	5.00
LTE Band5	6.11
LTE Band7	8.01
LTE Band12	5.61
LTE Band18	6.07
LTE Band19	6.11
GSM850	-3.89
GSM1900	1.50
UMTS Band 2	8.01
UMTS Band 4	5.00
UMTS Band 5	6.11

Note: Using frequency in 815~849MHz allows the use of antenna gain biggest -3.89 dBi.

Using frequency in 1850~1910MHz;1710~1755MHz; 2500~2570 MHz allows the use of antenna gain biggest 1.5 dBi.

7. Summary

Band	FCC Maximum admissible antenna gain (dBi)	IC Maximum admissible antenna gain (dBi)	Total Maximum admissible antenna gain (dBi)
LTE Band2	8.01	8.01	8.01
LTE Band4	5.00	5.00	5.00
LTE Band5	9.40	6.11	6.11
LTE Band7	8.01	8.01	8.01
LTE Band12	8.80	5.61	5.61
LTE Band18	9.35	6.07	6.07
LTE Band19	9.43	6.11	6.11
GSM850	-0.59	-3.89	-3.89
GSM1900	1.01	1.50	1.01
UMTS Band 2	8.01	8.01	8.01
UMTS Band 4	5.00	5.00	5.00
UMTS Band 5	9.4	6.11	6.11

Note: Using frequency in 815~849MHz allows the use of antenna gain biggest -3.89 dBi.

Using frequency in 1850~1910MHz;1710~1755MHz; 2500~2570 MHz allows the use of antenna gain biggest 1.01 dBi.

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