

InterLab[®]

RF Exposure and Maximum ERP/EIRP Assessment

For

**Cinterion[®] ALAS66A-US Data and Voice
Module**

FCC ID: QIPALAS66A-W

Assessment Reference: MDE_GEMALTO_1802_MPEb

Test Laboratory:

7layers GmbH
Borsigstrasse 11
40880 Ratingen
Germany



Deutsche
Akkreditierungsstelle
D-PL-12140-01-00

Note:

The following test results relate only to the devices specified in this document. This report shall not be reproduced in parts without the written approval of the test laboratory.

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0 Summary

0.1 Technical Report Summary

Type of Report

RF Exposure and Maximum ERP/EIRP Assessment for a 2G/3G/4G Data and Voice radio module.

Applicable FCC and ISSED Rules

For RF Exposure:

OET Bulletin 65 Edition 97-01 August 1997

FCC 47 CFR §1.1307

FCC 47 CFR §1.1310

RSS-102 Issue 5 – March 2015

For Maximum ERP/EIRP:

FCC 47 CFR §22.913

IC SRSP-503 Issue 7, September 2008

FCC 47 CFR §24.232

IC SRSP-510 Issue 5, February 2009

FCC 47 CFR §27.50(d)

RSS-139, Issue 3 / SRSP-513, July 2015

| Report version control | | | |
|------------------------|--------------|-----------------|------------------|
| Version | Release date | Changes | Version validity |
| initial | 2019-01-04 | Initial version | Valid |
| | | | |
| | | | |
| | | | |

Responsible for
Accreditation Scope: *



Responsible
for Report:



*ERP/EIRP Measurement is part of the accreditation scope

1 Administrative Data

1.1 Testing Laboratory

Company Name: 7Layers GmbH

Address Borsigstr. 11
40880 Ratingen
Germany

This facility has been fully described in a report submitted to the FCC and accepted under the registration number 96716.

The test facility is also accredited by the following accreditation organisation:
Laboratory accreditation no.: DAkkS D-PL-12140-01-00

Responsible for Accreditation Scope: Dipl.-Ing. Bernhard Retka
Dipl.-Ing. Robert Machulec
Dipl.-Ing. Andreas Petz
Dipl.-Ing. Marco Kullik

Report Template Version: 2016-08-30

1.2 Project Data

Responsible for assessment and report: Mr. Andreas Tübel

Date of Report: 2019-01-04

1.3 Applicant Data

Company Name: Gemalto M2M GmbH

Address: Siemensdamm 50
13629 Berlin
Germany

Contact Person: Mr. Axel Heike

1.4 Manufacturer Data

Company Name: please see applicant data

Address: please see applicant data

2 Test object Data

2.1 General EUT Description

| | |
|------------------------------|--------------------------------------|
| Equipment under Test | 2G/3G/4G Data and Voice radio module |
| Type Designation: | ALAS66A-W |
| Kind of Device: | 2G/3G/4G Data and Voice radio module |
| GPRS Multi-slot class | 12 |
| LTE CAT | 16 |
| FCC ID: | QIPALAS66A-W |

General product description:

The EUT is Cellular radio module supporting 2G/3G/4G Data and Voice.

2.2 EUT Main components

Type, S/N, Short Descriptions etc. used in this Test Report

| Short Description | Equipment under Test | Type Designation | Serial No. | HW Status | SW Status |
|---|----------------------|------------------|-----------------|--------------|-----------|
| EUT A (Code: DE1034036bx03) | LTE Module | ALAS66A-W | 004401082626769 | Rev.: 3.1.3a | 00.120 |
| Remark: EUT A is equipped with a temporary antenna connector. The Module is not sold with a predefined antenna. | | | | | |

NOTE: The short description is used to simplify the identification of the EUT in this test report.

2.3 Ancillary Equipment

For the purposes of this test report, ancillary equipment is defined as equipment which is used in conjunction with the EUT to provide operational and control features to the EUT. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless Ancillary Equipment can influence the test results.

| Short Description | Equipment under Test | Type Designation | HW Status | SW Status | Serial no. | FCC ID |
|-------------------|----------------------|------------------|-----------|-----------|------------|--------|
| N/A | | | | | | – |

2.4 Auxiliary Equipment

For the purposes of this test report, auxiliary equipment is defined as equipment which is used temporarily to enable operational and control features especially used for the tests of the EUT which is not used during normal operation or equipment that is used during the tests in combination with the EUT but is not subject of this test report. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless Auxiliary Equipment can influence the test results.

| Short Description | Equipment under Test | Type Designation | Serial no. | HW Status | SW Status | FCC ID |
|-------------------|----------------------|------------------|------------|-----------|-----------|--------|
| N/A | | | | | | – |

3 Evaluation Results

3.1 Maximum ERP / EIRP

| Standard | Frequency Band |
|---|---------------------------------------|
| FCC 47 CFR §22.913 IC RSS-132, Issue 3 | GSM 850, UMTS FDDV, LTE eFDD5, eFDD26 |
| FCC 47 CFR §24.232 IC RSS-133 Issue 6 | GSM 1900 |
| FCC 47 CFR §27.50(d) RSS-139, Issue 2 / SRSP-513 | LTE eFDD7 |
| FCC 47 CFR §90.205 90.635 | LTE eFDD26 |

3.1.1 Test Limits

For the 850MHz band, FCC §22.913 states that the maximum ERP of this device shall not exceed 7 Watts. IC SRSP-503 Issue 7, states that this device shall not exceed a maximum EIRP of 11.5 Watts. For the purposes of this test report, the 7 Watt ERP limit stipulated in FCC §22.913 has been converted to an equivalent EIRP value of 11.5 Watts.

For all other limits, refer to the values stipulated in the corresponding tables.

3.1.2 Test Protocol

| Band | Mode | Duty Cycle (%) | Frequency (MHz) | Maximum Conducted output power (dBm) | Maximum Conducted output power (mW) | Freq of highest power (MHz) | FCC / IC EIRP limit (mW) | Maximum antenna gain to meet EIRP Limit (dBi) |
|---------|-------------|----------------|-----------------|--------------------------------------|-------------------------------------|-----------------------------|--------------------------|---|
| 850 | GSM/(E)GPRS | 50.0% | 836.2 - 848.8 | 32.98 | 1986.0949 | 836.60 | 11484 | 7.6 |
| 1900 | GSM/(E)GPRS | 50.0% | 1850.2 - 1909.8 | 30.37 | 1088.9301 | 1850.20 | 2000 | 2.6 |
| FDD V | UMTS | 100.0% | 824 - 846.6 | 24.83 | 304.0885 | 836.60 | 11484 | 15.8 |
| eFDD 5 | LTE | 100.0% | 824 - 849 | 23.45 | 221.30947 | 824.70 | 11484 | 17.2 |
| eFDD 7 | LTE | 100.0% | 2500-2570 | 23.74 | 236.59197 | 2567.50 | 1000 | 6.3 |
| eFDD 26 | LTE | 100.0% | 814-849 | 23.56 | 226.98649 | 849.00 | 4921 | 13.4 |

3.1.3 Conclusion

| All gains in (dBi) | Band | Max gain to be used to comply with EIRP Limits | Max gain to be used to comply with FCC MPE Limits | Max gain to be used to comply with IC MPE Limits | Maximum gain to be compliant with all limits |
|--------------------|---------|--|---|--|--|
| | 850 | 7.6 | 2.5 | -0.8 | -0.8 |
| | 1900 | 2.6 | 8.0 | 4.5 | 2.6 |
| | FDD V | 15.8 | 8.5 | 5.2 | 5.2 |
| | eFDD 5 | 17.2 | 9.4 | 6.1 | 6.1 |
| | eFDD 7 | 6.3 | 12.0 | 9.4 | 6.3 |
| | eFDD 26 | 13.4 | 9.8 | 6.5 | 6.5 |

3.2 RF Exposure Evaluation for Module

| Standards |
|---|
| OET Bulletin 65 Edition 97-01 August 1997 |
| FCC 47 CFR §1.1307 |
| FCC 47 CFR §1.1310 |
| RSS-102 Issue 5 – March 2015 |

3.2.1 Test limits

As specified in Table 1B of 47 CFR 1.1310 – Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure.

| Frequency range (MHz) | Power density (mW/cm ²) |
|-----------------------|-------------------------------------|
| 300 – 1,500 | f/1500 |
| 1,500 – 100,000 | 1.0 |

Limits specified per RSS-102, Issue 5.

| Frequency range (MHz) | Power density (W/m ²) | Power density (mW/cm ²) |
|-----------------------|-----------------------------------|-------------------------------------|
| 300 – 6000 | $0.02619 f^{0.6834}$ | $mW/cm^2 = W/m^2 * 0.1$ |

Equation OET bulletin 65, page 18, edition 97-01:
$$S = \frac{PG}{4\pi R^2} = \frac{EIRP}{4\pi R^2}$$

Where:

S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the centre of radiation of the antenna

3.2.2 Test Protocol

| Maximum antenna gain to comply with MPE limits for FCC | | | | | | | | | |
|--|------|------------|-----------------|--------------------------------------|-------------------------------------|--|---------------------------------|--|--------------------------|
| Band | Mode | Duty Cycle | Frequency (MHZ) | Maximum Conducted output power (dBm) | Maximum Conducted output power (mW) | Equivalent conducted output power (mW) | MPE Limit (mW/cm ²) | Maximum antenna gain to meet MPE Limit (dBi) | Separation distance (cm) |
| 850 | GSM | 50% | 836.2 | 35 | 3162.28 | 1581.25 | 0.5575 | 2.5 | 20 |
| 1900 | GSM | 50% | 1850.2 | 32 | 1584.89 | 792.50 | 1.0000 | 8.0 | 20 |
| FDD 5 | UMTS | 100.0% | 836.6 | 26 | 398.11 | 398.11 | 0.5577 | 8.5 | 20 |
| eFDD 5 | LTE | 100.0% | 824.0 | 25 | 316.23 | 316.23 | 0.5493 | 9.4 | 20 |
| eFDD 7 | LTE | 100.0% | 2500.0 | 25 | 316.23 | 316.23 | 1.0000 | 12.0 | 20 |
| eFDD26 | LTE | 100.0% | 814.0 | 25 | 316.23 | 316.23 | 0.5427 | 9.8 | 20 |

* Conducted output power values bases on "Tune-up" information provided by manufacturer.

| Maximum antenna gain to comply with MPE limits for Industry Canada | | | | | | | | | |
|--|------|------------|-----------------|--------------------------------------|-------------------------------------|--|---------------------------------|--|--------------------------|
| Band | Mode | Duty Cycle | Frequency (MHZ) | Maximum Conducted output power (dBm) | Maximum Conducted output power (mW) | Equivalent conducted output power (mW) | MPE Limit (mW/cm ²) | Maximum antenna gain to meet MPE Limit (dBi) | Separation distance (cm) |
| 850 | GSM | 50% | 836.2 | 35.0 | 3162.28 | 1581.25 | 0.2602 | -0.8 | 20 |
| 1900 | GSM | 50% | 1850.2 | 32.0 | 1584.89 | 792.50 | 0.4477 | 4.5 | 20 |
| FDD 5 | UMTS | 100% | 836.6 | 26.0 | 398.11 | 398.11 | 0.2602 | 5.2 | 20 |
| eFDD 5 | LTE | 100% | 824.0 | 25.0 | 316.23 | 316.23 | 0.2576 | 6.1 | 20 |
| eFDD 7 | LTE | 100% | 2500.0 | 25.0 | 316.23 | 316.23 | 0.5499 | 9.4 | 20 |
| eFDD26 | LTE | 100% | 814.0 | 25.0 | 316.23 | 316.23 | 0.2554 | 6.5 | 20 |

* Conducted output power values bases on "Tune-up" information provided by manufacturer.

3.2.3 Conclusion

| Band | Max gain for FCC MPE Limits | Max gain for Industry Canada MPE Limits | Maximum gain to be compliant with all limits |
|--------|-----------------------------|---|--|
| 850 | 2.5 | -0.8 | -0.8 |
| 1900 | 8.0 | 4.5 | 4.5 |
| FDD 5 | 8.5 | 5.2 | 5.2 |
| eFDD 5 | 9.4 | 6.1 | 6.1 |
| eFDD 7 | 12.0 | 9.4 | 9.4 |
| eFDD26 | 9.8 | 6.5 | 6.5 |