InterLab®

RF Exposure and Maximum ERP/EIRP Assessment

For

Cinterion® ALAS66A-US Data and Voice Module

FCC ID: QIPALAS66A-US
IC: 7830A-ALAS66AUS

Assessment Reference: MDE_GEMALTO_1802_MPEc

Test Laboratory:
7layers GmbH
Borsigstrasse 11
40880 Ratingen
Germany

DAkkS Deutsche Akkreditierungsstelle D-PL-12140-01-00

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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 ISED 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	2019-02-11	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:	2019-02-11

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-US
Kind of Device:	2G/3G/4G Data and Voice radio module
GPRS Multi-slot class	12
LTE CAT	16
FCC ID:	QIPALAS66A-US
IC ID:	7830A-ALAS66AUS

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: DE1034040am01)	LTE Module	ALAS66A-US	004401082104247	Rev. 2.2	Rev. 00.192
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
FCC 47 CFR §24.232 IC RSS-133 Issue 6	GSM 1900, UMTS FDD II, LTE eFDD2,
FCC 47 CFR §27.50(d) RSS-139, Issue 2 / SRSP-513	UMTS FDD IV, LTE eFDD4, LTE eFDD7, LTE eFDD12, LTE eFDD13, LTE eFDD66

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 ERIP 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	50.0%	824.24 - 848.8	33.97	2494.5947	824.24	11484	6.6
1900	GSM	50.0%	1850.2 - 1909.8	31.03	1267.6519	1880.00	2000	2.0
FDD 2	UMTS	100.0%	1850 - 1907.6	25.47	352.37087	1908.83	2000	7.5
FDD 4	UMTS	100.0%	1710 - 1752.6	25.27	336.51157	1734.09	1000	4.7
FDD 5	UMTS	100.0%	824 - 846.6	25.51	355.63132	848.09	11484	15.1
eFDD 2	LTE	100.0%	1850-1910	23.93	247.17241	1907.67	2000	9.1
eFDD 4	LTE	100.0%	1710-1755	23.49	223.35722	1732.67	1000	6.5
eFDD 5	LTE	100.0%	824 - 849	23.7	234.42288	836.69	11484	16.9
eFDD 7	LTE	100.0%	2500-2570	23.46	221.81964	2505.10	1000	6.5
eFDD13	LTE	100.0%	777-787	23.89	244.90632	779.71	3000	10.9
eFDD 12	LTE	100.0%	699 - 716	23.9	245.47089	707.71	3000	10.9
eFDD66	LTE	100.0%	1710 - 1780	23.58	228.03421	1745.51	1000	6.4

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	**6.6**	**3.4**	**0.1**	0.1
	1900	**2.0**	**6.0**	**2.5**	2.0
	FDD 2	**7.5**	**11.0**	**7.5**	7.5
	FDD 4	**4.7**	**11.0**	**7.3**	4.7
	FDD 5	**15.1**	**8.4**	**5.1**	5.1
	eFDD 2	**9.1**	**12.0**	**8.5**	8.5
	eFDD 4	**6.5**	**12.0**	**8.3**	6.5
	eFDD 5	**16.9**	**9.4**	**6.1**	6.1
	eFDD 7	**6.5**	**12.0**	**9.4**	6.5
	eFDD13	**10.9**	**9.2**	**5.9**	5.9
	eFDD12	**10.9**	**8.7**	**5.6**	5.6
	eFDD66	**6.4**	**12.6**	**8.3**	6.4

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/cm²)*
300 – 1,500	f/1500
1,500 – 100,000	1.0

Limits specified per RSS-102, Issue 5.

Frequency range (MHz)	*Power density (W/m²)*	*Power density (mW/cm²)*
300 – 6000	$0.02619\ f^{0.6834}$	*mW/cm² = W/m² * 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/cm²)	Maximum antenna gain to meet MPE Limit (dBi)	Separation distance (cm)
850	GSM	50%	836.2	34	2511.89	1256.03	0.5575	**3.4**	20
1900	GSM	50%	1850.2	34	2511.89	1256.03	1.0000	**6.0**	20
FDD 2	UMTS	100.0%	1850.0	26	398.11	398.11	1.0000	**11.0**	20
FDD 4	UMTS	100.0%	1710.0	26	398.11	398.11	1.0000	**11.0**	20
FDD 5	UMTS	100.0%	824.0	26	398.11	398.11	0.5493	**8.4**	20
eFDD 2	LTE	100.0%	1850.0	25	316.23	316.23	1.0000	**12.0**	20
eFDD 4	LTE	100.0%	1710.0	25	316.23	316.23	1.0000	**12.0**	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
eFDD13	LTE	100.0%	777.0	25	316.23	316.23	0.5180	**9.2**	20
eFDD 12	LTE	100.0%	699.0	25	316.23	316.23	0.4660	**8.7**	20
eFDD66	LTE	100.0%	1710.0	25	316.23	316.23	1.1400	**12.6**	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/cm²)	Maximum antenna gain to meet MPE Limit (dBi)	Separation distance (cm)
850	GSM	50%	836.2	34.0	2511.89	1256.03	0.2602	**0.1**	20
1900	GSM	50%	1850.2	34.0	2511.89	1256.03	0.4477	**2.5**	20
FDD 2	UMTS	100%	1850.0	26.0	398.11	398.11	0.4476	**7.5**	20
FDD 4	UMTS	100%	1710.0	26.0	398.11	398.11	0.4242	**7.3**	20
FDD 5	UMTS	100%	824.0	26.0	398.11	398.11	0.2576	**5.1**	20
eFDD 2	LTE	100%	1850.0	25.0	316.23	316.23	0.4476	**8.5**	20
eFDD 4	LTE	100%	1710.0	25.0	316.23	316.23	0.4242	**8.3**	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
eFDD13	LTE	100%	777.0	25.0	316.23	316.23	0.2474	**5.9**	20
eFDD 12	LTE	100%	699.0	25.0	316.23	316.23	0.2302	**5.6**	20
eFDD66	LTE	100%	1710.0	25.0	316.23	316.23	0.4242	**8.3**	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	**3.4**	**0.1**	0.1
1900	**6.0**	**2.5**	2.5
FDD 2	**11.0**	**7.5**	7.5
FDD 4	**11.0**	**7.3**	7.3
FDD 5	**8.4**	**5.1**	5.1
eFDD 2	**12.0**	**8.5**	8.5
eFDD 4	**12.0**	**8.3**	8.3
eFDD 5	**9.4**	**6.1**	6.1
eFDD 7	**12.0**	**9.4**	9.4
eFDD13	**9.2**	**5.9**	5.9
eFDD 12	**8.7**	**5.6**	5.6
eFDD66	**12.6**	**8.3**	8.3