

RF Exposure Calculation Report

For

Cinterion® PLAS9-X GSM/UMTS/LTE Data Module

FCC ID QIPPLAS9-X
IC: 7830A-PLAS9X

Report Reference: MDE_GEMALTO_1711_MPEa

Test Laboratory:

7layers GmbH
Borsigstrasse 11
40880 Ratingen
Germany

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.

7layers GmbH
Borsigstraße 11
40880 Ratingen, Germany
T +49 (0) 2102 749 0
F +49 (0) 2102 749 350

Geschäftsführer/
Managing Directors:
Frank Spiller
Bernhard Retka
Alexandre Norré-Oudard

Registergericht/registered:
Düsseldorf HRB 75554
USt-Id.-Nr./VAT-No. DE203159652
Steuer-Nr./TAX-No. 147/5869/0385

a Bureau Veritas
Group Company

www.7layers.com

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0 Summary

0.1 Technical Report Summary

Type of Report

RF Exposure for a GSM/UMTS/LTE 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

Report version control			
Version	Release date	Changes	Version validity
000	2017-12-10	Initial version	valid

Reviewed by
Dirk Bratsch:



Responsible
for Report:



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.

Report Template Version: 2014-05-15

1.2 Project Data

Responsible for calculation and report: Mr. Andreas Tübel

Date of Report: 2017-12-10

1.3 Applicant Data

Company Name: Gemalto M2M GmbH

Address: Siemensdamm 50
13629 Berlin
Germany

Contact Person: Leandro Wan-Dall

1.4 Manufacturer Data

Company Name: please see applicant data

Address:

Contact Person:

2 Test object Data

2.1 General EUT Description

Equipment under Test	GSM/(E)GPRS/UMTS/HSPA/LTE Data Module
Type Designation:	PLAS9-X
Kind of Device: GPRS/EDGE MSC	GSM/UMTS/LTE Data Module
GPRS Multi-slot class	12
FCC ID:	QIPPLAS9-X
IC Number:	7830A-PLAS9X

General product description:

The EUT is Cellular radio module supporting GSM/UMTS/LTE/GPRS/EGPRS/HSDPA/HSUPA

3 Evaluation Results

3.1 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

3.1.1 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

3.1.2 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 / GPRS	50%	836.2	33.5	2238.72	1119.44	0.5575	4.0	20
1900	GSM / GPRS	50%	1850.2	30.5	1122.02	561.05	1.0000	9.5	20
FDD 2	UMTS	100.0%	1850.2	24.5	281.84	281.84	1.0000	12.5	20
FDD 4	UMTS	100.0%	1710.0	24.5	281.84	281.84	1.0000	12.5	20
FDD 5	UMTS	100.0%	824.0	24.5	281.84	281.84	0.5493	9.9	20
eFDD 2	LTE	100.0%	1850.2	23.5	223.87	223.87	1.0000	13.5	20
eFDD 4	LTE	100.0%	1710.0	23.5	223.87	223.87	1.0000	13.5	20
eFDD 5	LTE	100.0%	824.0	23.5	223.87	223.87	0.5493	10.9	20
eFDD 12	LTE	100.0%	699.0	23.5	223.87	223.87	0.4660	10.2	20
eFDD 13	LTE	100.0%	777.0	23.5	223.87	223.87	0.5180	10.7	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 / GPRS	50%	836.2	33.5	2238.72	1119.44	0.2602	0.7	20
1900	GSM / GPRS	50%	1850.2	30.5	1122.02	561.05	0.4477	6.0	20
FDD 2	UMTS	100.0%	1850.2	24.5	281.84	281.84	0.4477	9.0	20
FDD 4	UMTS	100.0%	1710.0	24.5	281.84	281.84	0.4242	8.8	20
FDD 5	UMTS	100.0%	824.0	24.5	281.84	281.84	0.2576	6.6	20
eFDD 2	LTE	100.0%	1850.2	23.5	223.87	223.87	0.4477	10.0	20
eFDD 4	LTE	100.0%	1710.0	23.5	223.87	223.87	0.4242	9.8	20
eFDD 5	LTE	100.0%	824.0	23.5	223.87	223.87	0.2576	7.6	20
eFDD 12	LTE	100.0%	699.0	23.5	223.87	223.87	0.2302	7.1	20
eFDD 13	LTE	100.0%	777.0	23.5	223.87	223.87	0.2474	7.4	20

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

3.1.3 Conclusion

Band and operating mode	Max gain for FCC MPE Limits	Max gain for Industry Canada MPE Limits	Maximum gain to be compliant with all MPE limits
Band 13 700 MHz (LTE)	10.7	7.4	7.4
Band 12 700 MHz (LTE)	10.2	7.1	7.1
Band 5, 850 MHz (GSM/UMTS/LTE)	4.0	0.7	0.7
Band 4, 1700 MHz (UMTS/LTE)	12.5	8.8	8.8
Band 2, 1900 MHz (GSM/UMTS/LTE)	9.5	6.0	6.0

All gains in (dBi)