



# RF Exposure Evaluation Report

FOR

## Sequans Corporation

Model Number: VZ120Q

Product Description: LTE Module

FCC ID: 2AAGMVZ120Q

FCC CFR 47 Part 1.1310, 2.1091

TEST REPORT #: EMC\_VERIZ-036-15002\_FCCICMPE

DATE: 2015-11-05



FCC: Recognized  
A2LA Accredited

IC recognized #  
3462E-1

### **CETECOM Inc.**

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**Assessment**

**The following equipment, as detailed in section 3 of this test report, meets the RF exposure limits and/or the conditions for exemption from routine evaluation as defined in the following standards.**

Standard	Version
FCC CFR 47 Part 1.1310	Current as of 10-15-2015
FCC CFR 47 Part 2.1091	Current as of 10-15-2015
FCC KDB 447498	v05r02
OET Bulletin 65	Edition 97-01, August 1997

**Responsible for Testing Laboratory:**

2015-11-05	Compliance	Milton Ponce de Leon (Test Lab Manager)	
Date	Section	Name	Signature

**Responsible for the Report:**

2015-11-05	Compliance	Anthony Planinac (EMC Engineer)	
Date	Section	Name	Signature

The test results of this test report relate exclusively to the test item specified in Section 3. CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM Inc. USA.

**1 Administrative Data****1.1 Identification of the Testing Laboratory Issuing the Test Report**

<b>Company Name</b>	CETECOM Inc.
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<b>Test Lab Manager</b>	Milton Ponce de Leon
<b>Project Manager</b>	
<b>Test Engineer</b>	

**1.2 Identification of the Client**

<b>Applicant's Name:</b>	Sequans Communications
<b>Street Address:</b>	15-55, Boulevard Charles de Gaulle
<b>City/Zip Code</b>	92700 Colombes, France
<b>Country</b>	France
<b>Contact Person:</b>	Sankara Subramanian
<b>Phone No.</b>	+ 1 32-859-4724
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<b>e-mail:</b>	sankara@sequans.com

**1.3 Identification of the Manufacturer**

<b>Manufacturer's Name:</b>	Same as client.
<b>Manufacturers Address:</b>	
<b>City/Zip Code</b>	
<b>Country</b>	

## 2 Equipment under Test (EUT)

### 2.1 Specification of the Equipment under Test

<b>Marketing Name:</b>	Sequans VZ120Q Module
<b>Model Number:</b>	VZ120Q
<b>FCC-ID :</b>	2AAGMVZ120Q
<b>Product Description:</b>	LTE Module
<b>Operating Frequency Ranges (MHz) / Channels:</b>	LTE Band 13 (700MHz): 777 MHz – 787 MHz LTE Band 4 (1700 MHz): 1710 -1755 MHz
<b>Type(s) of Modulation:</b>	QPSK and 16 QAM
<b>Rated Max power:</b>	LTE Band 13=25dBm. LTE Band4=25dBm
<b>Antenna info (antenna presented for testing with the development board):</b>	LTE Band 4 (1700): Antenna gain = 2 dBi LTE Band 13 (700MHz): Antenna gain = -8 dBi
<b>Rated Operating Voltage Range:</b>	Vmin: 3.6V/ <b>Vnom: 3.9V</b> / Vmax: 4.2V
<b>Rated Operating Temperature Range:</b>	-10°C ~ +55°C
<b>Test Sample Status:</b>	Prototype
<b>Marketing Name:</b>	Sequans VZ120Q Module
<b>Device Category</b>	<input type="checkbox"/> Fixed Installation <input checked="" type="checkbox"/> Mobile <input type="checkbox"/> Portable
<b>Exposure Category</b>	<input type="checkbox"/> Occupational/ Controlled <input checked="" type="checkbox"/> General Population/ Uncontrolled

Note: This Report is based on a 20cm distance from Human body (Device Category = Mobile)

**2.2 Identification of the Equipment Under Test (EUT)**

EUT #	Serial Number	HW Version	SW Version	Note
1	USI-15-16-0368	1.0	LR4.3.0	

**2.3 Identification of Accessory Equipment**

AE #	Type	Model	HW Version	SW Version	Note
1	AC ADAPTER	YS12-050020U	NA	NA	Output 5V, 2A
2	External Antenna	OmniLOG 90200	NA	NA	700MHz – 2.4GHz

**2.4 Miscellaneous Information**

### 3 RF Exposure Evaluation Requirements

#### 3.1 FCC:

Calculations can be made to predict RF field strength and power density levels around typical RF sources using the general equations (3) and (4) on page 19 of the following FCC document: “OET Bulletin 65, Edition 97-01 - Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields”.

The table below is excerpted from Table 1B of CFR 47 1.1310 titled Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure:

Frequency Range (MHz)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
300 – 1500	f (MHz) /1500	30
1500 – 100.000	1.0	30

Using the equation from page 19 of OET Bulletin 65, Edition 97-01:

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (in appropriate units, e.g. mW/cm<sup>2</sup>)  
 P = power input to the antenna (in appropriate units, e.g., mW)  
 G = power gain of the antenna in the direction of interest relative to an isotropic radiator  
 R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

#### **Additionally, according to § 2.1091:**

The limit for <1.5 GHz mobile operations where no routine evaluation is required is: 1.5W ERP  
 The limit for >1.5 GHz mobile operations where no routine evaluation is required is: 3W ERP

Note:

1. This device is to be used only for fixed and mobile applications.
2. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all the persons

#### 4 Measurement Summary

Peak radiated power is calculated as

$$\text{EIRP (dBm)} = \text{Maximum average output power (including tune-up tolerance) (dBm)} + \text{Antenna Gain (dBi)}$$

$$\text{ERP (dBm)} = \text{EIRP (dBm)} - 2.15$$

Tune-up tolerance is taken from Sequans Module documentation

Antenna gain is taken from OmniLOG 90200 Datasheet (B13=-8dBi), B4=+2dBi)

Analysis to Exclude Routine RF Exposure Evaluation for Stand Alone Operation			
Band of Operation	ERP		FCC Limit
MHz	dBm	W	W
Band 4 1710 to 1755	24.85	0.3	3
Band 13 777 to 787	14.85	0.03	1.5

Since the ERP is less than the FCC limit, this device is exempt from routine evaluation.

**For modular approvals only:**  
**Maximum Antenna Gain Analysis to Comply With Limits**

**Band 13 Frequency Band**

Maximum output power considerations:

Mode	Maximum conducted output power (dBm)	Maximum conducted output power (mW)	Duty cycle	Equivalent conducted output power (Maximum conducted output power x duty cycle) (mW)	Distance (cm)
LTE	25	316	100%	316	20

***FCC Analysis***

S	MPE limit for uncontrolled exposure:	0.525	mW/cm <sup>2</sup>
G <sub>1</sub>	Antenna gain to comply with MPE limits:	9.21	dBi
G <sub>2</sub>	Antenna gain to exclude routine RF Exposure Analysis According to §2.1091	8.91	dBi
G <sub>3</sub>	Antenna gain to comply with ERP limits = 34.8 dBm according to §27.50	11.92	dBi

The maximum antenna gain for mobile operation to comply with MPE and ERP limits shall not exceed **8.9 dBi**.



**For modular approvals only:**  
**LTE Band IV frequency band**

Maximum output power considerations:

Mode	Maximum conducted output power (dBm)	Maximum conducted output power (mW)	Duty cycle	Equivalent conducted output power (Maximum conducted output power x duty cycle) (mW)	Distance (cm)
LTE	25	316	100%	316	20

**FCC Analysis**

S	MPE limit for uncontrolled exposure:	1	mW/cm <sup>2</sup>
G <sub>1</sub>	Antenna gain to comply with MPE limits:	12.0	dBi
G <sub>2</sub>	Antenna gain to exclude routine RF Exposure Analysis According to §2.1091	11.9	dBi
G <sub>3</sub>	Antenna gain to comply with EIRP limit = 30dBm according to §27.50	5.0	dBi

The maximum antenna gain for mobile operation to comply with MPE and ERP limits shall not exceed **5 dBi**.

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## 5 Revision History

Date	Report Number	Changes to Report	Report prepared by
2015-10-15	EMC_VERIZ-036-15002_FCCICMPE_v1.0	First revision	MPDL
2015-11-05	EMC_VERIZ-036-15002_FCCICMPE_v1.1	Product description update	MPDL