

# SAR Exclusion Evaluation Report

**Project Number:** 4238300

**Report Number:** 4238300EMC03

**Revision Level:** 0

**Client:** Altair Semiconductor

**Equipment Under Test:** CAT-1 LTE Module

**Model Name:** ALT1210MOD-VZ-01

**Applicable Standards:** 47 C.F.R. §§ 2.1091 and 2.1093;  
FCC KDB 447498

**Report issued on:** 11 December 2017

**Conclusion:** SAR testing is exempt in the following conditions

- Distance to extremity is 53 mm or greater
- Distance to body is 79 mm or greater

*Remarks: This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.*

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## TABLE OF CONTENTS

<b>1</b>	<b>GENERAL INFORMATION.....</b>	<b>3</b>
1.1	CLIENT INFORMATION .....	3
1.2	TEST LABORATORY .....	3
1.3	GENERAL INFORMATION OF EUT .....	3
1.4	OPERATING MODES AND CONDITIONS .....	3
<b>2</b>	<b>SAR EXCLUSION .....</b>	<b>4</b>
2.1	CONCLUSION .....	4
2.2	REQUIREMENT .....	4
2.3	PRODUCT INFORMATION.....	5
2.4	SUMMARY .....	5
2.5	CALCULATIONS – BAND 4 (1710-1755 MHz).....	6
2.6	CALCULATIONS – BAND 13 (777-787 MHz).....	7
<b>3</b>	<b>REVISION HISTORY .....</b>	<b>8</b>

## 1 General Information

### 1.1 Client Information

Name: Altair Semiconductor  
Address: 6 Ha'harash st. P.O. Box 7158  
City, State, Zip, Country: Hod Hasharon 45240, Israel

### 1.2 Test Laboratory

Name: SGS North America, Inc.  
Address: 620 Old Peachtree Road NW, Suite 100  
City, State, Zip, Country: Suwanee, GA 30024, USA

### 1.3 General Information of EUT

Type of Product: CAT-1 LTE Module  
Model Number: ALT1210MOD-VZ-01  
Serial Number: ALT1710110007041  
FCC ID: ALTMOD001R0  
  
IMEI Number: 000000000000000  
IMSI Number: 001010123456063  
  
Rated Voltage: 3.8 Vdc  
Test Voltage: 3.8 Vdc  
Tx Frequency Range: 1710 – 1755 MHz (LTE Band 4)  
777 – 787MHz (LTE Band 13)  
  
FCC Classification: PCS Licensed Transmitter PCB  
Type: Pre-Production

Sample Received Date: 14 November 2017

### 1.4 Operating Modes and Conditions

For this assessment, the EUT's maximum power including the maximum tolerance was considered.

## 2 SAR Exclusion

### 2.1 Conclusion

SAR testing is not applicable.

### 2.2 Requirement

From KDB 447498 D01 General RF Exposure Guidance V06

#### 4.3. General SAR test exclusion guidance

##### 4.3.1. Standalone SAR test exclusion considerations

Unless specifically required by the *published RF exposure KDB procedures*, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding *SAR Test Exclusion Threshold* condition(s), listed below, is (are) satisfied. These test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum *test separation distance* required for the exposure conditions. The minimum *test separation distance* defined in 4.1 f) is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander. To qualify for SAR test exclusion, the *test separation distances* applied must be fully explained and justified, typically in the SAR measurement or SAR analysis report, by the operating configurations and exposure conditions of the transmitter and applicable host platform requirements, according to the required *published RF exposure KDB procedures*. When no other RF exposure testing or reporting are required, a statement of justification and compliance must be included in the equipment approval, in lieu of the SAR report, to qualify for SAR test exclusion. When required, the device specific conditions described in the other *published RF exposure KDB procedures* must be satisfied before applying these SAR test exclusion provisions; for example, handheld PTT two-way radios, handsets, laptops and tablets, etc.

a) For 100 MHz to 6 GHz and *test separation distances*  $\leq 50$  mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

$$\left[ \frac{(\text{max. power of channel, including tune-up tolerance, mW})}{(\text{min. test separation distance, mm})} \right] \cdot \left[ \sqrt{f(\text{GHz})} \right] \leq 3.0 \text{ for 1-g SAR, and } \leq 7.5 \text{ for 10-g extremity SAR, where}$$

- $f(\text{GHz})$  is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- The values 3.0 and 7.5 are referred to as numeric thresholds in step b) below

The test exclusions are applicable only when the minimum *test separation distance* is  $\leq 50$  mm, and for transmission frequencies between 100 MHz and 6 GHz. When the minimum *test separation distance* is  $< 5$  mm, a distance of 5 mm according to 4.1 f) is applied to determine SAR test exclusion.

b) For 100 MHz to 6 GHz and *test separation distances*  $> 50$  mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

- 1)  $\{[\text{Power allowed at numeric threshold for 50 mm in step a)}] + [(\text{test separation distance} - 50 \text{ mm}) \cdot (f(\text{MHz})/150)]\}$  mW, for 100 MHz to 1500 MHz
- 2)  $\{[\text{Power allowed at numeric threshold for 50 mm in step a)}] + [(\text{test separation distance} - 50 \text{ mm}) \cdot 10]\}$  mW, for  $> 1500$  MHz and  $\leq 6$  GHz

c) For frequencies below 100 MHz, the following may be considered for SAR test:

- 1) For *test separation distances*  $> 50$  mm and  $< 200$  mm, the power threshold at the corresponding test separation distance at 100 MHz in step b) is multiplied by  $[1 + \log(100/f(\text{MHz}))]$
- 2) For *test separation distances*  $\leq 50$  mm, the power threshold determined by the equation in c) 1) for 50 mm and 100 MHz is multiplied by  $\frac{1}{2}$
- 3) SAR measurement procedures are not established below 100 MHz.

When SAR test exclusion cannot be applied, a KDB inquiry is required to determine SAR evaluation requirements for any SAR test results below 100 MHz to be acceptable.

## 2.3 Product Information

The device is a module that may be incorporated into extremity and body worn applications. If the distances are below the threshold, SAR testing must be performed followed by a Class 2 Permissive Change.

## 2.4 Summary

		Minimum Distance for SAR Exclusion (mm)	
Band	Frequency Range	Extremity Applications	Body Applications
4	1710-1755 MHz	53	71
13	777-787 MHz	38	79

## 2.5 Calculations – Band 4 (1710-1755 MHz)

### 2.5.1 Extremity

#### 447498 D01 General RF Exposure Guidance v06

SAR test exclusion calculations

Section 4.3: General SAR test exclusion guidance

	Input	Select Units
Max Power:	25	dBm
Min separation distance:	53	mm
Frequency, f:	1710	MHz

Value reference Number	Values used for Calculation	Reference number definition
v1	316 mW	[max. power of channel, including tune-up tolerance, mW] 'Rounded to nearest mW
v2	53 mm	[min. test separation distance, mm] 'Rounded to nearest mm
v3	1.308	[f(GHz)]

- b) For 100 MHz to 6 GHz and test separation distances > 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following (also illustrated in Appendix B)  
2)  $\{[\text{Power allowed at numeric threshold for 50 mm in step a)}] + [(\text{test separation distance} - 50 \text{ mm}) \cdot 10]\}$  mW, for > 1500 MHz and  $\leq$  6 GHz

Value reference Number	Values used for Calculation	Reference number definition
v4 <sub>1g</sub>	114.7 mW	[Power allowed at numeric threshold of 3.0 for 50 mm in step a)]
v4 <sub>10g</sub>	286.8 mW	[Power allowed at numeric threshold of 7.5 for 50 mm in step a)]
v5	3 mm	[(test separation distance – 50 mm)]
v6	10	[10]

1g Exclusion Threshold:	145 mW	$\leq v4_{1g} + (v5 \cdot v6)$
10g Exclusion Threshold:	317 mW	$\leq v4_{10g} + (v5 \cdot v6)$

**Conclusions:** The EUT max power is BELOW the threshold. SAR Testing is NOT required for Extremity applications

### 2.5.2 Body

#### 447498 D01 General RF Exposure Guidance v06

SAR test exclusion calculations

Section 4.3: General SAR test exclusion guidance

	Input	Select Units
Max Power:	25	dBm
Min separation distance:	71	mm
Frequency, f:	1710	MHz

Value reference Number	Values used for Calculation	Reference number definition
v1	316 mW	[max. power of channel, including tune-up tolerance, mW] 'Rounded to nearest mW
v2	71 mm	[min. test separation distance, mm] 'Rounded to nearest mm
v3	1.308	[f(GHz)]

- b) For 100 MHz to 6 GHz and test separation distances > 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following (also illustrated in Appendix B)  
2)  $\{[\text{Power allowed at numeric threshold for 50 mm in step a)}] + [(\text{test separation distance} - 50 \text{ mm}) \cdot 10]\}$  mW, for > 1500 MHz and  $\leq$  6 GHz

Value reference Number	Values used for Calculation	Reference number definition
v4 <sub>1g</sub>	114.7 mW	[Power allowed at numeric threshold of 3.0 for 50 mm in step a)]
v5	21 mm	[(test separation distance – 50 mm)]
v6	10	[10]

1g Exclusion Threshold:	325 mW	$\leq v4_{1g} + (v5 \cdot v6)$
<b>Conclusions:</b>	The EUT max power is BELOW the threshold. SAR Testing is NOT required for Body applications	

## 2.6 Calculations – Band 13 (777-787 MHz)

### 2.6.1 Extremity

#### 447498 D01 General RF Exposure Guidance v06

SAR test exclusion calculations

Section 4.3: General SAR test exclusion guidance

	Input	Select Units
Max Power:	25	dBm
Min separation distance:	38	mm
Frequency, f:	777	MHz

Value reference Number	Values used for Calculation	Reference number definition
v1	316 mW	[max. power of channel, including tune-up tolerance, mW] 'Rounded to nearest mW
v2	38 mm	[min. test separation distance, mm] 'Rounded to nearest mm
v3	0.881	[f(GHz)]

- a) For 100 MHz to 6 GHz and test separation distances  $\leq 50$  mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:  

$$\frac{[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [f(\text{GHz})]}{\leq 3.0 \text{ for 1-g SAR, and } \leq 7.5 \text{ for 10-g extremity SAR,}}$$

10g Exclusion Threshold:	323.3	mW	$\leq 7.5 \cdot v2 / v3$
Conclusions:	The EUT max power is BELOW the threshold. SAR Testing is NOT required for Extremity applications		

### 2.6.2 Body

#### 447498 D01 General RF Exposure Guidance v06

SAR test exclusion calculations

Section 4.3: General SAR test exclusion guidance

	Input	Select Units
Max Power:	25	dBm
Min separation distance:	79	mm
Frequency, f:	777	MHz

Value reference Number	Values used for Calculation	Reference number definition
v1	316 mW	[max. power of channel, including tune-up tolerance, mW] 'Rounded to nearest mW
v2	79 mm	[min. test separation distance, mm] 'Rounded to nearest mm
v3	0.881	[f(GHz)]

- b) For 100 MHz to 6 GHz and test separation distances  $> 50$  mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following (also illustrated in Appendix B)  
1)  $\{(\text{Power allowed at numeric threshold for 50 mm in step a}) + [(\text{test separation distance} - 50 \text{ mm}) \cdot (f(\text{MHz})/150)]\}$  mW, for 100 MHz to 1500 MHz

Value reference Number	Values used for Calculation	Reference number definition
v4 <sub>1g</sub>	170 mW	$\leq 3 \cdot 50 / V3$ [Power allowed at numeric threshold of 3.0 for 50 mm in step a)]
v5	29 mm	[test separation distance - 50 mm]
v6	5	[f(MHz)/150]

1g Exclusion Threshold:	320.4	mW	$\leq v4_{1g} + (v5 \cdot v6)$
Conclusions:	The EUT max power is BELOW the threshold. SAR Testing is NOT required for Body applications		

### 3 Revision History

Revision Level	Description of changes	Revision Date
0	Initial release	11 December 2017