



Radio Frequency Exposure Evaluation Report

For:
Atheros Inc

Model:
AOS ESR-M Residential

Product Description:
AOS Edge Card for Residential Electricity Meters

FCC ID: 2AWD3ESR5G3

Applied Rules and Standards:
CFR Part Part1 (1.1307 &1.1310), Part 2 (2.1091),
FCC KDB 447498 D01 General RF Exposure Guidance v06

Report number: EMC_AETHE_001_25001_RF_Exposure_Rev1

DATE: 2025-09-15



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1 Assessment

This RF Exposure evaluation report provides evidence for compliance of the below identified device with the RF Exposure limits for mobile devices as defined in FCC CFR Part 1 (1.1307 &1.1310), Part 2 (2.1093) under worst case conditions (measured or rated RF output power, antenna gain, distance towards human body, multiple transmitter information as presented by the applicant).

In addition, maximum antenna gain or minimum distance towards the human body is calculated respectively, where relevant.

The device meets the limits as stipulated by the above given FCC rule parts based on available specifications for worst-case conditions at 20 cm distance to the body.

Company Name	Product Description	Model No.
Atheros Inc	AOS Edge Card for Residential Electricity Meters	AOS ESR-M Residential

Report Reviewer:

2025-09-15	Compliance	Alvin, Ilarina (Director of EMC Services)	
Date	Section	Name	Signature

Responsible for the Report:

2025-09-15	Compliance	Art Thammanavarat (Lead Engineer)	
Date	Section	Name	Signature

The test results of this test report relate exclusively to the test item specified in Section3.

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2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
EMC Lab Manager:	Alvin, Ilarina
Responsible Project Leader:	Jayalakshmi, Sekar

2.2 Identification of the Client

Client Firm/Name:	Aetheros Inc
Street Address:	80 Liberty Ship Way, Suite 6
City/Zip Code	Sausalito, CA 94965
Country	USA

2.3 Identification of the Manufacturer

Manufacturer's Name:	
Manufacturers Address:	Same as Client
City/Zip Code	
Country	

3 Equipment under Assessment

3.1 EUT Specifications

Product Description:	AOS Edge Card for Residential Electricity Meters
Model Name:	AOS ESR-M Residential
HW Version:	v3.0
SW Version:	v7.2
FCC-ID:	2AWD3ESR5G3
Bands/Modes Supported	<p>Cellular Modules Company Name: u-blox AG Model Number : SARA-R520M10X FCC: XPYUBX19KM01 ISED: 8595A-UBX19KM01</p> <p>Wireless Technologies LTE FDD/TDD CAT-M1 Band: 2,4,5,8,12,13,25,26,66,71,85</p> <p>Wi-Fi Modules Company Name: Texas Instruments Model Number: CC33MOD FCC: Z64-CC33SBMOD</p> <p>Wireless Technologies Wi-Fi 2.4GHz</p> <p>GPS Modules Company Name: u-blox AG Model Number: SARA-M52010</p>
Power Supply/ Rated Operating Voltage Range	4V DC, 8A
Operating Temperature Range	Low: -40 °C to High +65 °C
Sample Revision	<input checked="" type="checkbox"/> Production <input type="checkbox"/> Pre-Production
EUT Dimensions	PCBA = 90mm x 49mm x 11mm
EUT Diameter	<input checked="" type="checkbox"/> < 60 cm <input type="checkbox"/> Other _____
Note: The information of the EUT specifications in the table above is provided by the client.	

4 RF Exposure Limits and FCC Basic Rules

FCC

4.1.1 § 2.1093(c)(1)

Evaluation of compliance with the exposure limits in § 1.1310 of this chapter, and preparation of an EA if the limits are exceeded, is necessary for portable devices having single RF sources with more than an available maximum time-averaged power of 1 mW, more than the ERP listed in Table 1 to § 1.1307(b)(3)(i)(C), or more than the P_{th} in the following formula, whichever is greater. The following formula shall only be used in conjunction with portable devices not exempt by § 1.1307(b)(3)(i)(C) at distances from 0.5 centimeters to 20 centimeters and frequencies from 0.3 GHz to 6 GHz.

$$P_{th}(\text{mW}) = ERP_{20\text{ cm}}(\text{mW}) = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

4.1.2 § 2.1093(c)(2)

For multiple mobile or portable RF sources within a device operating in the same time averaging period, routine environmental evaluation is required if the formula in § 1.1307(b)(3)(ii)(B) of this chapter is applied to determine the exemption ratio and the result is greater than 1.

4.1.3 § 1.1307(b)(3)(ii)(B)

in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

5 Evaluations

Analysis of RF Exposure

5.1 FCC RF Exposure (Standalone)

Radio	Tech-Band	Freq-Low _[GHz]	Pwr _[dBm]	Power _[W]	Ant-G _[dBij]	ERP _[mW]	Threshold ERP _[W]	ERP < Threshold ERP _[W]	FCC 2.1093(c)(1) Pth _[mW] = ERP _{20cm}	P/P _{th} ratio
Cellular	LTE 2	1.8550	22.67	0.185	3.90	276.69	0.77	Yes	3060.00	0.090
	LTE 4	1.7150	23.17	0.207	3.90	310.46	0.77	Yes	3060.00	0.101
	LTE 12	0.7040	22.21	0.166	3.85	246.04	0.36	Yes	1436.16	0.171
	LTE 13	0.7820	22.62	0.183	3.85	270.40	0.40	Yes	1595.28	0.169
Radio	Tech-Band	Freq-Low _[GHz]	Pwr _[dBm]	Power _[W]	Ant-G _[dBij]	ERP _[mW]	Threshold ERP _[W]	ERP < Threshold ERP _[W]	FCC 2.1093(c)(1) Pth _[mW] = ERP _{20cm}	P/P _{th} ratio
WLAN	802.11b	2.4120	16.08	0.0406	3.85	59.98	0.77	Yes	3060.00	0.020

Conclusion:

- The maximum RF emissions from this equipment fulfills the RF exclusion threshold limits for separation distance between the antenna and the human body greater than 20 cm. No RF Exposure evaluation is required.

5.2 RF Exposure Test Exemptions for Simultaneous Transmission Sources

- Theoretically, the worst case of simultaneous transmission operating at the highest output power mode, within the nearest frequency bands.
- The worst case of simultaneous transmission calculation :
 LTE Band 12 + WLAN 802.11b (2.45 GHz)
 $(246.04/1436.16) + (59.98/3060) = 0.191$

Applicable Simultaneous Transmission Sources	Sum of the ratios of the applicable terms	Limit	RF Exclusion No evaluation required
LTE Band 12 + Wi-Fi 2.4GHz	0.171 + 0.020 = 0.191	≤ 1	Yes

Conclusion:

- The sum of the fractional contributions to the applicable thresholds is less than or equal to 1, hence the multiple RF sources are exempt

6 Revision History

Date	Report Name	Changes to report	Report prepared by
2025-09-08	EMC_AETHE_001_25001_RF_Exposure	Initial Version	Art Thammanavarat
2025-09-15	EMC_AETHE_001_25001_RF_Exposure_Rev1	Report Revised Sections 5.1 and 5.2: Updated Table	Art Thammanavarat

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