

AOS Edge Card for Residential Meters

Data Sheet

The AOS Edge Card for residential electricity meters (AOS ESR-M) provides the latest in open standards-based, secure, edge computing and communications using public, private, and hybrid 5G/LTE CatM1 networks. The AOS ESR-M comes factory integrated with the Aclara I-210+c™ and R600 series electricity meters.

Based on Texas Instrument's Arm® Cortex®-A53-based Sitara AM62x edge microcontroller series, the AOS ESR-M provides more than ample computing resources required by today's most advanced edge analytics at a reasonable price. In addition, the TI AM62x MCU's hardware-enforced root-of-trust, secure boot, dedicated security processor with HSM, the Arm® Trustzone®-based Trusted Execution Environment (TEE), and leading cryptographic cores allow the AOS ESR-M to exceed the most stringent government and utility industry security requirements.



AOS Edge Card for Residential Electricity Meters

The AOS ESR-M comes with one, two, or four 64-bit Arm Cortex A53 1.4Ghz microprocessor clusters, 512MB DDR4 memory, 8GB eMMC flash, two core Programmable Real-time Unit Subsystem (PRUSS), and an optional Graphical Processing Unit (GPU). For secure wireless communications, the AOS ESR-M comes with integrated 5G/LTE Cat-M1 and WiFi 6.0 radios. It also comes with a dedicated GPS/GNSS receiver for accurate geographic positioning (1.5m) and a GPST-based clock required for advanced distribution networking analytics. In addition, the AOS ESR-M comes with a multi-profile eSIM chip and the AOS eSIM Remote SIM Provisioning service provides public and private network flexibility eliminating the risk of stranded network assets.

AOS is an open standards-based Distributed Operating System and Edge Intelligence Hub built on Linux and other open-source software. It is designed to facilitate secure and open edge computing as well as the internetworking of devices.

Utilizing oneM2M standards and the OMA LightweightM2M protocol, AOS provides utilities with an open, interoperable, and extensible IoT Service Layer. It integrates an IEEE x.509 security framework that leverages dynamic group policies to monitor, secure, configure, and manage devices at scale, all while offering a simple, centralized management experience through an intuitive web-based user interface and a comprehensive suite of open APIs.

For managing edge applications, AOS employs LF Energy GEISA-compliant Linux Namespaces (for application isolation) and Control Groups (for managing computing and network resources). This approach creates user-space Linux Containers that provide virtualization for the operating system, as well as isolation for compute, network, and file systems. Digitally signed application manifests authorize the allocation of resources for individual edge applications. Network access includes the oneM2M messaging service and direct access to specific IoT network protocol interfaces such as CoAP and MQTT.

The AOS Metering Services APIs (AOS MS APIs) offer application developers a comprehensive suite of LF Energy GEISA-compliant APIs designed for advanced meter reading and control functions. These APIs support multiple meters and metering protocols, providing easy access to instantaneous and cumulative meter readings, real-time electricity waveform streams, at varying sampling rates and frequencies, as well as other advanced features for Remote Service Connect / Disconnect, Pre-paid Metering, and Distributed Energy Resource (DER) control for authorized applications, among other capabilities.

AOS ESR-M provides an open, secure, Linux-based edge computing platform that supports machine learning. With its open oneM2M and Lwm2M IoT service layer, managing devices, intelligent edge applications, and networks has never been easier.



Radio Interfaces	Internal Antenna Supported Frequencies	TX Power	Data Rate
LTE Cat-M1	LTE bands: 2, 4, 12, 13, and 71	23.0 dBm	Up to 1 Mbps
WiFi 6 (802.11ax)	2400 MHz	20.5 dBm	50 Mbps
GPS / GNSS	1575-1610 MHz	-	-

Meter Interfaces	Interface Use	Logic Level
12 Pin Header -- 1X UART	Meter Reading, Programming, and Control	3.3V
12 Pin Header -- 8X GPIOs	Meter Events, Cautions, and Alerts Signaling	3.3V
20 Pin Header -- 1X SPI	Meter Waveform & System Packet Streaming; Daughter Card Interface	3.3V
20 Pin Header -- 1X UART	Meter Reading, Programming, and Control; Daughter Card Interface	3.3V
20 Pin Header -- 4X GPIOs	Meter Events, Cautions, and Alerts Signaling; Daughter Card Interface	3.3V

Power Information	
DC Power	Input Voltage: 4V, 8.5W maximum peak power
Power Usage	Avg Demand in Idle Mode = 1.25 W, Avg Demand during TX = 1.75 W, Peak Demand during TX = 2.00 W
Signal Holdup Time	5 Minutes of Holdup Power for Reliable Event Signaling (i.e., outage and tamper)

-20 °C to +65°C	Recommended Operating Range Temperature (outside of the electricity meter)
-40 °C to +85°C	Software Limited Range of Operation Temperature (inside the electricity meter)
-40 °C to +85°C	Storage Temperature
95% non-condensing	Humidity

Standards and Certifications	
Cellular and EMC	FCC: Part 15.247 & Part 15B ISED: IC ISSED RSS-247 & ICES-003 CISPR 32:2015GSM TS.51 and TS.24 PTCRB NAPRD03 v6.8 Conformance Test Cases 3GPP TS 36.521-1, TS 36.523-1, TS 36.124, and TS 102.230-1 ANSI C63.4-2014 with FCC Part 15 Subpart B/Class B, ICES-003 Issue 6 Class B
Industry and Safety	ANSI C12.20 IEC 60068-2.78 IEC 62052-31:2015
Security	Secure Boot with hardware-enforced Root of Trust, support for takeover protection, IP protection, and anti-roll back protection. TI Trusted Execution Environment, based on Arm® TrustZone®, with firewall support for isolation, secure watchdog/timer/IPC, secure storage support, and replay protected memory block support. Dedicated Security Controller with HSM core and dedicated security DMA & IPC subsystem. Cryptographic acceleration with session-aware cryptographic engine, ability to auto-switch key-material on incoming data stream, and cryptographic cores for: AES 128-/192-/256-Bit key sizes, SHA2 224-/256-/384-/512-Bit key sizes. DRBG with a true random number generator. PKA (Public Key Accelerator) assist for RSA/ECC processing for Secure Boot.
FCC & ISED	NOTICE: This device complies with Part 15 of the FCC Rules and contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.



	AVIS: L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement. NOTICE: Changes or modifications made to this equipment not expressly approved by Aetheros Inc may void the FCC authorization to operate this equipment. RADIOFREQUENCY RADIATION EXPOSURE INFORMATION: This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: • Reorient or relocate the receiving antenna. • Increase the separation between the equipment and receiver. • Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. • Consult the dealer or an experienced radio/TV technician for help.
Meter Protocols	ANSI/PSEM (ANSI C12.18/.19) IEC DLMS/COSEM (AC Electricity Smart Meter Generic Companion Profile)

Smart Meters Supported	
Hubbell Aclara	I-210+c™ and R600 series electricity meters