aROK 8110

Intel® 8th/9th Gen Core™/Xeon® CPU + Inference Accelerator

AI Powered for Autonomous and Machine Vision

TAIWAN EXCELLENCE 2022

Main Features

- Rolling stock AI recognition and machine vision applications
- Up to 8-core Intel® 8th/9th Gen Core™/Xeon® CPU processing power
- 4 x PCIe 3.0 slots for discrete graphics/inference/frame grabber cards
- Ultra-fast NVMe M.2/U.2 media for high-speed multi-cameras image capture
- RAID 0/1/5/10 configurable for data secure and integrity
- 24/36 VDC input with ignition management
- Special fixture design avoids vibration issues with GPU and PCIe cards
- Functionality of WWAN/5G NR, WLAN and GNSS with up to 4 SIM slots
- Compliant with EN 50155 OT4 and MIL-STD-810G for anti-vibration/ shock w/ graphics card and PCIe card installed
- Smart fan design with temperature-based RPMs

Specifications

CPU
- Intel® Coffee-Lake S/Refresh Core™/Xeon® i7/i5/i3/Pentium®/Celeron® processor (LGA1151)

PCH
- Intel® chipset C246

Memory
- Two 260-pin DDR4 SO-DMIM sockets
- Up to 32GB+32GB in size, 2400/2666 MHz

Storage
- 4 x 2.5" SATA 3.0 SSD/HDD (15mm height), or 3 x 2.5" SATA 3.0 SSD/HDD + 2 x M.2 2242/2260/2280 Key M NVMe SSD (PCIe 3.0 x2), or 3 x 2.5" SATA 3.0 SSD/HDD + 1 x U.2 NVMe SSD (PCIe 3.0 x2/SATA 3.0)
- 1 x CFast (externally accessible)

Expansion
- 1 x Full size mPCIe socket (USB 2.0, PCIe 3.0)
- 1 x Full size mPCIe socket (USB 2.0) for LTE module, BOM optional M.2 3042 Key B socket (USB 2.0) for LTE module with 1 x external, 1 x internal SIM
- 1 x M.2 3042/3050/3052 Key B socket (USB 2.0, USB 3.1 Gen2) for LTE/5G NR module with 1 x external, 1 x internal SIM
- 1 x PCIe 3.0 x16 slot for discrete graphics card, up to 321mm in length
- 3 x PCIe 3.0 x4 slot, up to 240mm in length

GigE/Frame Grabber (optional)
- 4-Port independent GbE w/ 802.3af/at, max. 60W, M12 X-coded

Discrete Graphics Card (optional)
- Up to NVIDIA® RTX 3090, 450W or more advanced in the future

GPS and Sensor
- 1 x Default U-blox NEO-M8N GNSS module for GPS/Glonass/QZSS/Galileo/Beidou
- Optional modules with dead reckoning available
- Built-in G-sensor

LAN
- 2-Port independent GbE LAN, M12 X-coded
- 9K byte jumbo frame
- PTP (IEEE 1588) support
- Controller: Intel® i210-T1, PHY: Intel® I219-LM
- vPro (iAMT) & WOL support

Security
- TPM 2.0: Infineon SLB9660TT1.2-FW4.40 (BOM optional)

I/O Ports, Front-Plate
- Waterproof DC input connector with ignition for 24/36 VDC-IN
- Power button
- Reset button
- 6 x LED indicators for power/IGN/WLAN/WWAN/LAN status
- 4 x LED indicators for storage/fan control
- 5 x LED indicators for user to program
- 1 x USB 3.1 Gen2 + 1 x USB 2.0, type A
- 1 x DB15 (CAN/DIO, 4 x DI/4 x DO + 1 x CAN 2.0B)
- 1 x DB15 (EXT.), reserved for expansion (or DB9 for DR signal)
- 7 x SMA antenna holes
- 2 x DB9 (COM3/COM4) for RS232/RS422/RS485 selectable (isolation)

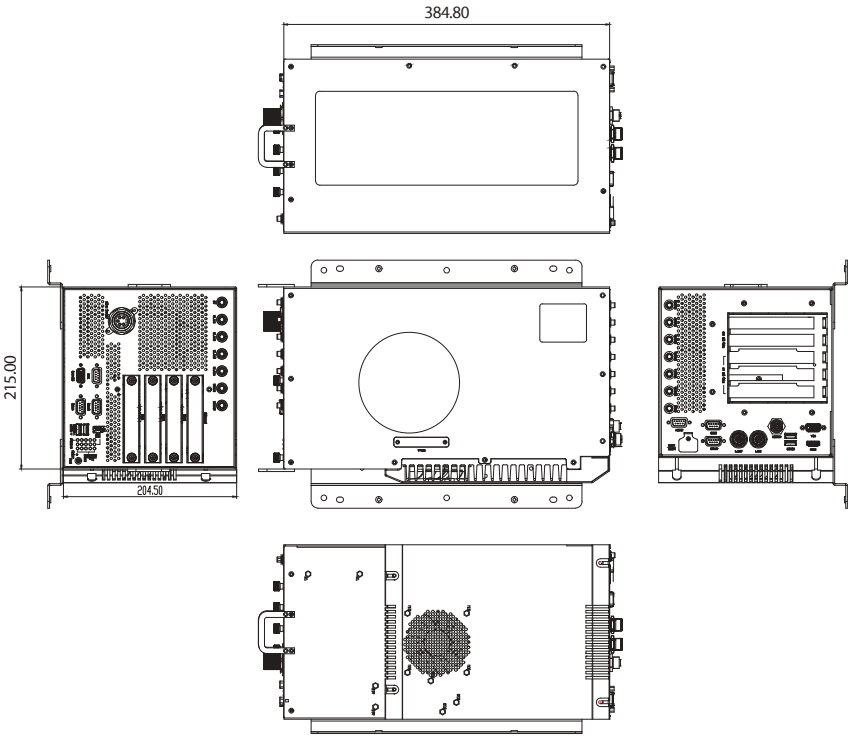
I/O Ports, Rear-Plate
- 2 x USB 3.1 Gen2, type A
- 1 x M12 A-coded connector for 2 x USB 2.0
- 2 x GbE (M12 X-coded)
- 1 x VGA + 1 x HDMI
- 2 x DB9 (COM1/COM2) for RS232/RS422/RS485 selectable (isolation)
- 2 x SIM slots
- 1 x SMA antenna hole for GNSS
- 6 x SMA antenna holes
- 1 x PCIe x16 lane slot
- 3 x PCIe x4 lane slots
- 1 x DB9 (AUDIO, female) for 1 x Mic-in (stereo), 2 x Line-out (stereo)

Display
- 1 x VGA port, up to 1920 x 1200@60Hz
- 1 x HDMI v1.4, up to 4096 x 2160@30Hz

DI/DO (isolation)
- 4-Bit input
  - Source: 9~48V-IN (12V@1.1mA/24V@2.2mA)
  - External: 0~33VDC pull-high, high-level, 3.3 - 33 VDC; low-level, 0-2 VDC
- 4-Bit output
  - Source: 9~48V-IN (nominal 35mA@24V)
  - External: 5~27VDC pull-high, sink current w/ 220mA for each bit, 500mA max (@25C)
- Source or external can be selected by software (default: source type)

Fan
- 1 x CPU fan
- 1 x System fan

Dimension Drawing



CAN 2.0B (isolation)
- CAN 2.0B (isolation)
- Controller: SJA1000
- Bit rate up to 1Mbit/s
- Socket CAN supported
- 11-bit & 29-bit identifiers, ISO 11898-1, ISO 11898-2
- ESD: ± 8KV/15KV (contact/air)
- 2.5KV isolated

Power Management
- 24/36 VDC-IN
- Cranking voltage: 6V~9V (< 30 seconds)
- Reverse protection, OCP & UVP
- Ignition on/off control/programmable on/off delay timer

Operating System
- Windows 10/Linux

Dimensions
- 215 x 205 x 385 (W x D x H) (mm)

Weight
- 10.5 kg

Environment
- Operating temperatures
  - EN 50155, class OT4 -40~70°C, 85°C for 10 minutes (w/ 35W TDP CPU, industrial SSD) with air flow
- Storage temperatures: -40°C~85°C
- Relative humidity: 10%~95% (non-condensing)
- Vibration (random)
  - IEC 60068-2-64 1.0g@5~500Hz (in operating, HDD), 1.6g for HDD w/ damping brackets
  - IEC 60068-2-64 2.0g@5~500Hz (in operating, SSD + graphics card)
- Vibration (SSD + graphics card)
  - Operating: MIL-STD-810G, 514.6C, category 4
  - Storage: MIL-STD-810G, 514.6, category 24, minimum integrity test
- Shock (SSD + graphics card)
  - Operating: MIL-STD-810G, Method 516.6, procedure I, functional shock=40g
  - Non-operating: MIL-STD-810G, Method 516.6, procedure V, crash hazard shock test=75g

Certifications
- CE
- FCC Class A
- EN 50155: 2017
  - Ambient temperature EN 50155, Class OT4 (-40~70°C), 85°C for 10 minutes
  - Interruptions of voltage supply class S1
  - Supply change over class C1, C2
  - EMC EN 50121-1: 2017, EN 50121-3-2: 2016+A1: 2019
  - Environment EN 60068-2-1, EN 60068-2-2, EN 60068-2-30
  - Shock and vibration IEC 61373 Class B
  - Protective coating class PC1 (PC2, by request)
- EN 45545-2: 2013+A1:2015

Ordering Information

- **aROK 8110-A (P/N: 10A20811000X0)**
  Barebone system. Intel® 8th/9th Gen Core™/Xeon® CPU (LGA 1151), dual SO-DIMM up to 64GB DDR4

- **Options**

CPU			
Model Name	Core	Freq.	TDP
Xeon® E-2278GE	8c	4.7GHz	80W
Xeon® E-2278GEL	8c	3.9GHz	35W
Core™ i7-9700E	8c	4.4GHz	65W
Core™ i7-9700TE	8c	3.8GHz	35W
Core™ i7-8700T	6c	4.0GHz	35W
Core™ i5-9500E	6c	4.2GHz	65W
Core™ i5-9500TE	6c	3.6GHz	35W
Core™ i3-9100E	4c	3.7GHz	65W
Core™ i3-9100TE	4c	3.2GHz	35W
Coffee-Lake Refresh Core™ i9 Series (8c, 65W in max.) by request			
SO-DIMM DDR4			
4GB	8GB	16GB	32GB
Graphics card			
RTX30xx series (Up to 450W)	GTX16xx series (Up to 120W)	Tesla T4 (70W)	AIBooster-X8 (20W)
Others			
Fixture/ PCIe card	Fixture/CG card	4-Port GbE/PoE card (GEM640)	Damping brackets	NVMe M.2 storage board

We reserve the right to change specifications and product descriptions at any time without prior notice.