nROK 1031/1031-C2

Intel Atom® 6413E Processor
Fanless Rolling Stock Computer

nROK 1031

nROK 1031-C2

Main Features

- Intel Atom® x6413E quad-core processor, 9W
- Compact and fanless design
- 5G NR and Wi-Fi 6/6E wireless communication options
- Built-in U-blox M9N GNSS
- Built-in 1 x CAN bus 2.0B (optional SAE J1939)
- 1 x mini-PCIe + 2 x M.2 socket expansions
- 2 x POE support, total 60W (nROK 1031-C2)
- Dual display outputs
- Optional AI accelerator M.2/mPCIe module
- Certified by CE/UKCA/FCC/EN 50155

Product Overview

nROK 1031 features next-generation Intel Atom® x6413E processor quad-core 1.5GHz, with powerful graphics and multimedia enhancements. It offers an on-board CAN 2.0B, an optional OBD interface (SAE J1939) for vehicle diagnostics, and an advanced GNSS receiver supporting GPS+QZSS/Glonass/Galileo/Beidou. Moreover, for connectivity, it provides optional WLAN (Wi-Fi 5/6/6E) and optional WWAN (LTE/5G NR) wireless data. In consideration for convenience, there are dual micro-SIMs and one micro-SIM with an external access design, allowing users to easily access the micro-SIM card. Equipped with an optional AI accelerator M.2/mPCIe module, the nROK 1031 also functions as a reliable AI edge computing platform, providing innovative AI solutions for the rolling stock. With a rugged, fanless, and compact enclosure, this fanless computer can easily be installed.

The nROK 1031-C2 provides dual IEEE 802.3af/at PoE functions and is suited for most PoE devices. This includes connecting with wireless access points and IP cameras. Furthermore, an additional 12VDC output can be provided for an external display via easy power wire arrangements. nROK 1031 is a flexible rolling stock computer that meets the various demands of train applications, such as wireless gateway, infotainment, dispatching system, AI edge computing, and mobile video surveillance.

Specifications

CPU

- Intel Atom® x6413E quad-core processor, 1.5GHz, TDP 9W

Memory

- 1 x 260-pin DDR4 SO-DIMM socket support 3200MHz up to 32GB. Default 2666MHz, 4GB
- With In-Band ECC (IBECC)

Video Output

- 1 x HDMI 1.4b up to 3840 x 2160@30Hz
- 1 x VGA port 1920 x 1200@60Hz

Storage

- 1 x 2.5" SATA 3.0 internal drive bay (9.5mm)
- 1 x M.2 2280 Key M for SATA 3.0

Expansion

- 1 x Full size mini-PCIe socket (USB 2.0, PCIe 3.0), BOM optional M.2 3042 Key B socket (USB 2.0, USB 3.2 Gen 2) for LTE/5G NR module with 1 x internal micro-SIM and 1 x external micro-SIM
- 1 x M.2 2230 Key E socket (USB 2.0, PCIe 3.0 x2), BOM optional M.2 2230 Key E socket (USB 2.0, PCIe 3.0, PCIe 3.0)
- 1 x M.2 3042/3050/3052 Key B socket (USB 2.0, USB 3.2 Gen 2) for LTE/5G NR module with 1 x internal micro-SIM and 1 x external micro-SIM

GNSS and Onboard Sensor

- 1 x Default U-blox NEO-M9N GNSS module for GPS+QZSS/Glonass/Galileo/Beidou
- 1 x 3D accelerometer and 3D gyroscope

LAN and Power over Ethernet

- 1-Port LAN M12 X-coded, 10/100/1000/2500 Mbps Ethernet, Intel® Ethernet Controller I225-IT (support WOL)
- 1-Port LAN M12 X-coded, 10/100/1000 Mbps Ethernet, Marvell Ethernet PHY 88E1512
- 2-Port LAN M12 X-coded, 10/100/1000/2500 Mbps Ethernet, PoE 802.3af/at, max 60W, isolation (nROK 1031-C2)

Security

- TPM 2.0: Infineon SLB9670VQ2.0 FW7.62

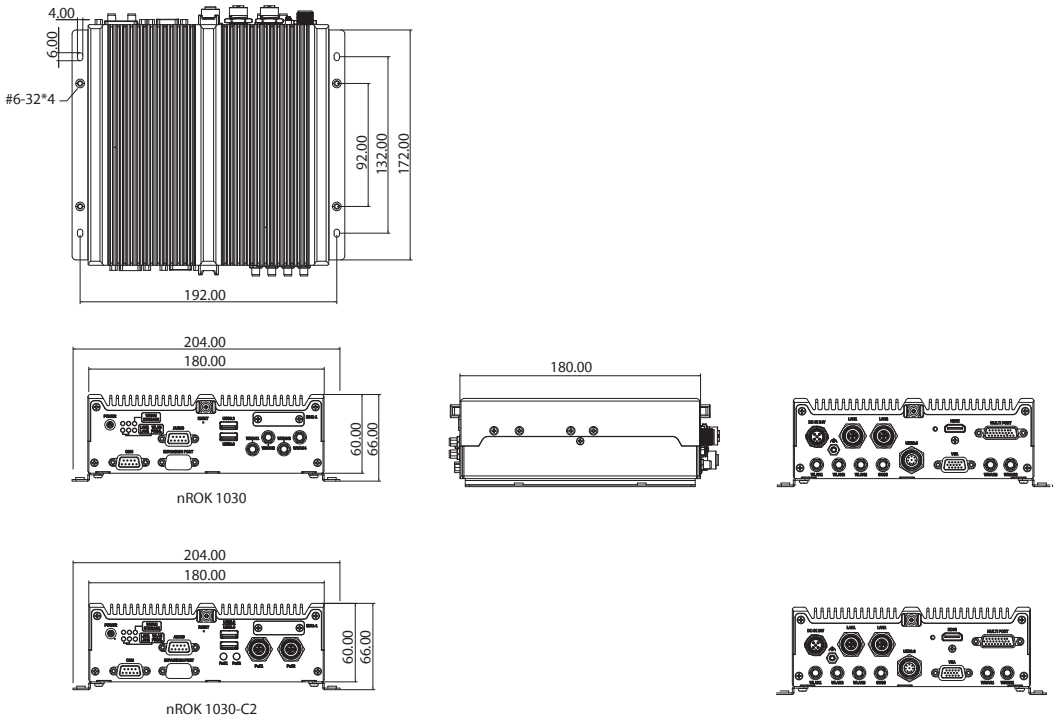
I/O Interface-Front

- 6 x LED indicators (including 1 x programmable LED)
- 1 x USB 3.2 Gen 2 type A (5V/0.9A)
- 1 x USB 2.0 type A (5V/0.5A)
- 1 x Externally accessible micro-SIM card sockets with cover
- 1 x Reset button
- 1 x Power button
- 1 x DB9 (COM) for full RS232/422/485
- 1 x DB9 (Audio) for 1 x Mic-in, 1 x Line-out
- 1 x DB9 for Expansion Port (Optional)
- 2 x M12 X-coded PoE, including 2 x PoE LED light (nROK 1031-C2)
- 4 x SMA connector holes for WWAN (nROK 1031)

I/O Interface-Rear

- 1 x HDMI
- 1 x VGA
- 1 x LAN (LAN1) M12 X-coded, 10/100/1000/2500 Mbps

Dimension Drawing



- 1 x LAN (LAN2) M12 X-coded, 10/100/1000 Mbps
- 1 x M12 A-coded 8-pin for 2 x USB 2.0 (5V/0.5A)
- 1 x DB26 (MULTI PORT)
  - 1 x Isolated CANBus 2.0B
  - 1 x RS232 Tx/ Rx
  - 1 x GNSS speed/direction
  - 5 x DI and 4 x DO
  - 2 x RS485
  - 12V/ 2A DC output
  - GND
- 1 x M12 A-coded 5-pin for power/ignition input
- 1 x SMA connector for GNSS
- 2 x SMA connector holes for WWAN
- 3 x RP-SMA connector holes for WLAN

Power Management & Software Support

- Power input 24VDC (9~36VDC) w/o isolation
- Cranking voltage: 6V~9V (< 30 seconds)
- Reverse protection, OCP & UVP
- Selectable boot-up & shut-down voltage for low power protection by software
- Setting 8-level power on/off delay time by software
- 10~255 seconds WDT support, setup by software
- SDK (Windows/Linux) including utility and sample code

Operating System

- Windows 11/Windows 10/Linux

Dimensions

- 180mm (W) x 180mm (D) x 60mm (H)

Weight

- nROK 1031: 2.08kg
- nROK 1031-C2: 2.2kg

Environment

- Operating temperatures
  - EN 50155, class OT4 (-40°C ~70°C), 85°C for 10 minutes (w/ industrial SSD) with air flow
- Storage temperatures: -40°C to 85°C
- Relative humidity: 90% (non-condensing)
- Vibration (random)
  - 2g@5~500 Hz (in operation, SSD)
- Vibration (SSD)
  - Operating: MIL-STD-810H, Method 514.8C, Procedure 1, Category 4, common carrier US highway truck vibration exposure
  - Storage: MIL-STD-810H, Method 514.8E, Procedure 1, Category 24, minimum integrity test
- Shock (SSD)
  - Operating: MIL-STD-810H, Method 516.8, Procedure I, functional shock=40g
  - Non-operating: MIL-STD-810H, Method 516.8, Procedure V, crash hazard shock test=75g

Certifications

- CE
- UKCA
- FCC Class A
- EN 50155: 2017
  - Ambient temperature EN 50155, Class OT4 (-40°C ~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: 2020 (PCB)

Ordering Information

- **nROK 1031-A (P/N: 10A00103100X0)**
  Intel Atom® x6413E processor 1.5GHz with 4GB DDR4, U-blox NEO-M9N GNSS module, 1 x CAN 2.0B, 1 x VGA output, 1 x HDMI output, 1 x internal SSD tray, 2 x LAN M12 X-coded, 1 x mini-PCIe slot, 2 x M.2 slots, 2 x micro-SIMs, 1 x USB 3.2 Gen 2, 3 x USB 2.0, 1 x full RS232/422/485, 1 x RS232 Tx/Rx, 2 x RS485, 5 x DI & 4 x DO

- **nROK 1031-AC2 (P/N: 10A00103101X0)**
  Intel Atom® x6413E processor 1.5GHz with 4GB DDR4, U-blox NEO-M9N GNSS module, 1 x CAN 2.0B, 1 x VGA output, 1 x HDMI output, 1 x internal SSD tray, 2 x LAN M12 X-coded, 1 x mini-PCIe slot, 2 x M.2 slots, 2 x micro-SIMs, 1 x USB 3.2 Gen 2, 3 x USB 2.0, 1 x full RS232/422/485, 1 x RS232 Tx/ Rx, 2 x RS485, 5 x DI & 4 x DO, 2 x PoE M12 X-coded