

BC51M

Rugged Industrial Box PC with Intel Apollo Lake-I

Railway & Automotive Embedded Computer for Communication & Control

- » Intel Atom E3900 series
- » Up to 8 GB DDR3 DRAM soldered, ECC
- » 32 GB eMMC soldered
- » 2 DisplayPorts, up to 4096 x 2160 pixels each
- » 2 Gigabit Ethernet, 1 USB 2.0
- » WLAN, 4G LTE, GNSS via 2 PCI Express Mini Card slots
- » 2 Slots for IBIS, GPS, RS232, RS485, RS422
- » -40 °C to +85 °C operating temperature, fanless
- » Compliant to EN 50155 (railways) and ISO 7637-2 (E-mark for automotive)



For Onboard Applications

The BC51M is a maintenance-free box computer that has been designed for use in vehicles, e.g. in trains, commercial vehicles, mobile machines or airplanes for applications such as Internet-On-Board, positioning via GNSS, entertainment or predictive maintenance. An MVB option is available to support integration into the Train Communication Network (TCN).

Wireless Communication

The BC51M can take over typical on-board wireless functions, whether it is an Internet connection for passengers or locating the vehicle. Two PCI Express Mini Card slots and two micro-SIM slots provide flexibility in implementing mobile service standards up to 4G LTE or WLAN/WLAN IEEE 802.11, and derivatives.

Solid Processing Performance

The BC51M is powered by an Intel Atom processor from the E3900 series running at up to 1.6 GHz. Other dual/quad core processors of the Intel Atom E3900 series can be used, giving high scalability in CPU performance. The box PC features 8 GB DDR3 SDRAM and offers an SD card slot. A SATA hard-disk/solid-state drive can be installed within the housing as an option.

Fanless Operation for Mobile Applications

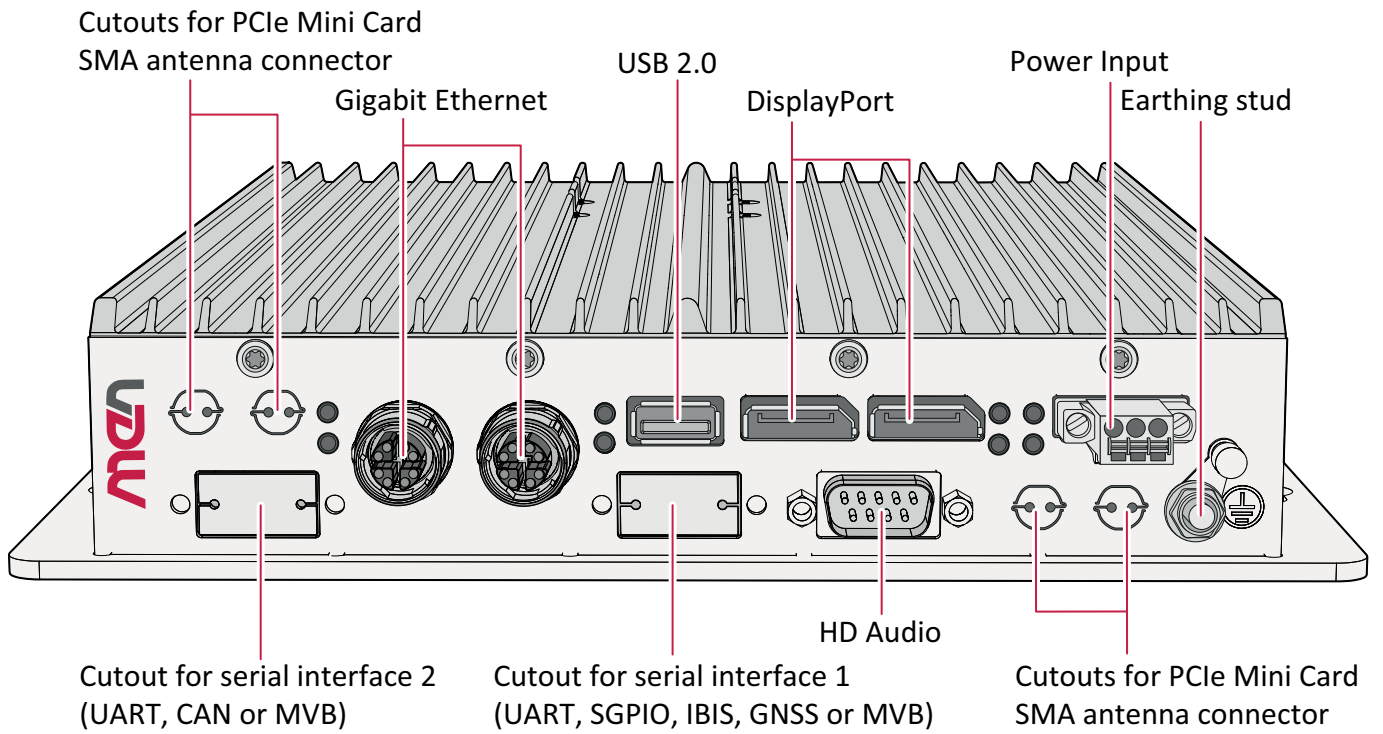
The system is designed for fanless operation at temperatures from -40 °C to +70 °C (+85 °C for up to 10 minutes), its special aluminum housing with cooling fins serves as a heat sink for the internal electronics and in this way provides conduction cooling.

Railway-Compliant PSU with Ignition Function

The BC51M comes with an integrated 30W wide-range DC/DC converter and is compliant with EN 50155 (nominal input voltages 24 and 36 V) as well as with ISO 7637-2 (E-mark for automotive) (nominal input voltage 24 V). The power can be switched on and off using an ignition signal on the power connector, and a shutdown-delay time after switching off the ignition signal can be adjusted by software.

Flexible I/O

The BC51M supports up to two DisplayPort interfaces with a maximum resolution of 4096 x 2160 each. A multitude of other I/O is available at the front, including two Gigabit Ethernet, one USB 2.0, one HD audio and two slots for legacy serial I/O (RS232), CAN bus, MVB or IBIS.



CPU

- The following CPU types are supported:
 - Intel Atom x5-E3930, dual core, 1.3 GHz, 6.5 W
 - Intel Atom x7-E3950, quad core, 1.6 GHz, 12 W

Memory

- System RAM
 - Soldered DDR3
 - 8 GB max.

Mass Storage

- The following mass storage devices can be assembled:
 - SSD 2.5" (SATA)
 - SD card
 - HDD 2.5" (SATA)
- The following mass storage devices are assembled:
 - eMMC (soldered); 32 GB

Graphics

- Processor graphics
- Maximum resolution: 4096x2160 pixels @ 60 Hz, 24 bpp (DisplayPort 1.2a)

Wireless Functionality

- Possible wireless functions:
 - GNSS
 - LTE
 - WLAN

Interfaces

- Video
 - 2x DisplayPort
- HD Audio
 - 1x, D-Sub, 9-pin, plug
 - Audio stereo in
 - Audio stereo out
 - SPDIF out
- USB
 - 1x USB 2.0, Type A
- Ethernet
 - 2x 1000BASE-T, M12, X-coded
- PCI Express Mini Card
 - 2x PCI Express Mini Card slot
 - Slot A: PCIe Full-Mini; PCIe x1, USB 2.0
 - Slot B: PCIe Full-Mini; PCIe x1, USB 2.0
- SIM card
 - 2x micro-SIM card slot, internally accessible
- Power input
 - 1x power inlet connector
 - Ignition input
- LED
 - Status: board status, power status
 - Ethernet: link, activity
 - User configurable: 2x
- Cutout
 - Antenna connector: RP-SMA receptacle, RP-SMA plug, QMA receptacle, QMA plug, FME receptacle, FME plug
 - D-Sub options: RS232, RS422/484, CAN, digital I/O, IBIS slave, GNSS, MVB

Supervision and Control

- Board management controller
- Watchdog timer
- Temperature measurement
- Real-time clock, buffered by supercapacitor (3 days)

Electrical Specifications

- Supply voltage
 - 24 V DC to 36 V DC nom. (EN 50155)
 - 110 V DC nom. (EN 50155)
 - 24 V DC nom. (ISO 7637-2)
 - EN 50155 power interruption class S2
- Isolation voltage 1500 VDC
 - Ethernet port 1, Ethernet port 2, power input, system ground (USB, Display Port, Audio...)

Mechanical Specifications

- Dimensions: (W) 240 mm, (D) 220 mm, (H) 44.1 mm
- Cooling
 - Air cooling, natural convection, airflow 0.4 m/s
- Protection rating
 - IP20
 - Other IP protection classes possible on request

**Product Compliance: Rail
- Rolling Stock**

- Operating temperature: -40 °C to +70 °C; 10 min @ +85 °C (EN 50155:2017, class OT4, class ST1, control cabinet)
- Storage temperature: -40 °C to +85 °C (EN 60068-2-1:2007, Ab; EN 60068-2-2:2007, Bb)
- Altitude: up to 1400 m above sea level (EN 50125-1:2014, class A1 standard)
- Humidity: +25/+55 °C, 95 % (EN 50155:2017)
- Shock: 50 m/s² / 30 ms (EN 61373:2010, vehicle body, cat. 1, class B)
- Vibration: 10 min @ 1.01 m/s² and 5 h @ 5.72 m/s² (EN 61373:2010, vehicle body, cat. 1, class B)
- Power supply
 - Interruption of voltage supply: 10 ms (EN 50155:2017, class S2)
 - Supply change-over: 100 ms @ 0.6 x Un (EN 50155:2017, class C1)
- Electrical Safety
 - EN 50155:2017
 - EN 50153:2014 + A1:2017
 - EN 50124-1:2017
 - EN ISO 13732-1:2006-09
- Fire Protection
 - EN 45545-2:2013+A1:2015; EL9 (only PCB - attached components will be accepted)
 - EN 50155:2017
- EMC Radiated emission:
 - EN 50121-3-2:2016
 - EMV 06
- EMC Conducted emission: EN 50121-3-2:2016
- EMC Immunity: EN 50121-3-2:2016

**Product Compliance:
Road Vehicle**

- EMC Radiated Emission: ECE R10 Rev.5
- EMC Conducted Emission: ECE R10 Rev.5
- EMC Immunity: ECE R10 Rev.5
- Flammability (PCBs)
 - ECE-R118

**Product Compliance:
Radio Devices**

- EMC Radiated Emission: EN 301 489-1 V2.1.1
- EMC Conducted Emission: EN 301 489-1 V2.1.1
- EMC Immunity: EN 301 489-1 V2.1.1

BIOS

- AMI Aptio UEFI Firmware

Software Support

- Windows
 - Windows 10 IoT Enterprise
- Linux
- For more information on supported operating system versions and drivers see Software.

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