

BC51M

Rugged Industrial Box PC with Intel Atom Processor E3900 Series 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, RS232, RS485, RS422
- » -40 °C to +70 °C (+85 °C), fanless
- » Compliant to EN 50155 (railways)
- » Prepared for 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

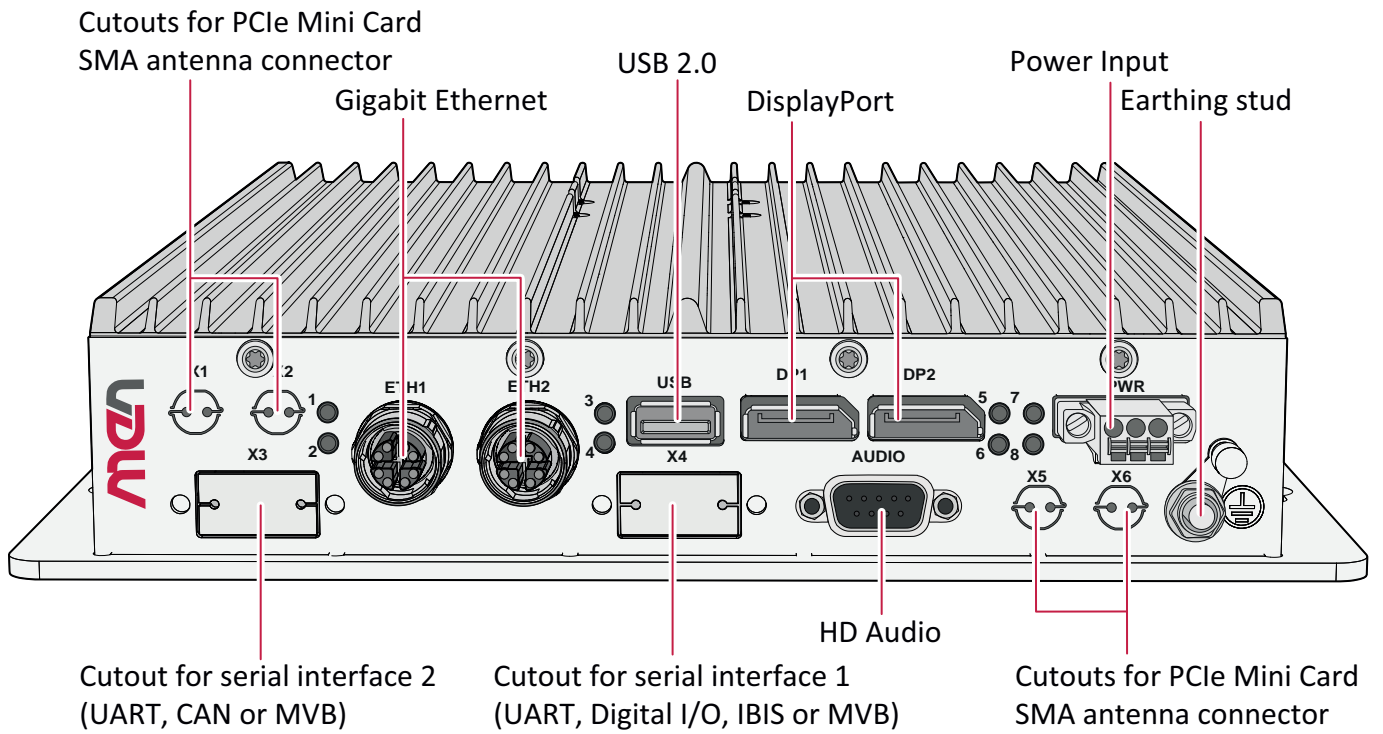
The BC51M comes with an integrated 30W wide-range DC/DC converter compliant with EN 50155 (nominal input voltages 24 and 36 V) and prepared for ISO 7637-2 (E-mark for automotive) (nominal input voltage 24 V). The power can be switched on and off using an ignition signal on the power connector, and a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

Long-Term Available and Future-Safe

Long-term availability until 2027 ensures an extended product life and future-safety.



CPU

- The following CPU types are supported:
 - Intel Atom x5-E3930, 2 cores, 2 threads, 1.3 GHz, 1.8 GHz Turbo Boost, 6.5 W, 2 MB cache
 - Intel Atom x7-E3950, 4 cores, 4 threads, 1.6 GHz, 2.0 GHz Turbo Boost, 12 W, 2 MB cache

Memory

- System RAM
 - Soldered DDR3
 - 8 GB max.

Security

- TPM (Trusted Platform Module 2.0)

Mass Storage

- The following mass storage devices can be assembled:
 - SSD/HDD 2.5" (SATA)
 - SD card
- 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

- This product includes interface options
 - Different wireless functions depending on assembled wireless interface cards
 - Variable I/O in cutouts
- SSD/HDD slot
 - 1 × SATA 2.5"; internally accessible
- SD/microSD card slot
 - 1 × SD card; UHS-I (104 MB/s (SDR104)); externally accessible
- Video
 - 2x DisplayPort
- HD Audio
 - 1x, D-Sub, 9-pin, plug
 - Stereo line input, single-ended
 - Stereo line output, differential
 - S/PDIF output
- USB
 - 1x USB 2.0, Type A
- Ethernet
 - 2x 10/100/1000BASE-T, M12, X-coded, receptacle
- 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
 - Earthing connection: M4 stud
- LED
 - Status: board status, power status
 - Ethernet: link, activity
 - User configurable: 2x
- Cutout
 - Antenna connector: RP-SMA receptacle, RP-SMA plug, SMA plug, SMA receptacle
 - D-Sub options: RS232, RS422, RS485, CAN bus, digital I/O, IBIS master, 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)
- Power consumption: 35 W max.

Mechanical Specifications

- Dimensions: (W) 240 mm, (D) 220 mm, (H) 44.1 mm
- Weight: 1.8 kg
- Mounting
 - Wall-mount
 - Rack-mount in 19" cabinet
- 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, +85 °C for 10 min (EN 50155:2017, class OT4, ST1)
- Rapid temperature variations: EN 50155:2017, class H1, no requirements
- Storage temperature: -40 °C (EN 50155:2017) to +85 °C (EN 60068-2-2, Bb)
- Altitude: +1400 m max. (EN 50125-1:2014, class A1)
- Pollution degree: EN 50124-1:2017, class PD2
- Humidity: +55 °C and +25 °C, 100 % max. (EN 50155:2017)
- Shock: 30 ms @ 50 m/s² (EN 61373:2010/AC:2017-09, vehicle body, cat. 1, class B)
- Vibration: 10 min @ 2.02 m/s² (functional) and 5 h @ 11.44 m/s² (long-life) (EN 61373:2010/AC:2017-09, vehicle body, cat. 1, class B x 2)
- Power supply
 - General compliance with power supply requirements of EN 50155:2017
 - Interruption of voltage supply: 10 ms (EN 50155:2017, class S2)
- Electrical Safety
 - EN 50155:2017
 - EN 50153:2014 + A1:2017
 - EN 50124-1:2017
 - EN ISO 13732-1:2008
- Fire protection: EN 45545-2:2013 + A1:2015, HL3
- EMC emission:
 - EN 50121-3-2:2016
 - Regelung Nr. EMV 06 :2014-07-29, Anhang E: Messung an Geräten
- EMC immunity: EN 50121-3-2:2016
- Protective coatings: EN 50155:2017, class PCX (As agreed between user and supplier)
- Useful life: 20 years (EN 50155:2017, class L4)

Product Compliance: Road Vehicle

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

Product Compliance: Radio Equipment

- EMC basic compliance
 - The product is prepared to comply with the Radio Equipment Directive 2014/53/EU (RED). Standards compliance depends on the assembled radio (wireless) device.

MTBF

- 304 288 h @ 40°C according to IEC/TR 62380 (RDF 2000)

BIOS/Boot Loader

- AMI Aptio UEFI Firmware

Software Support

- Linux
 - Supported kernel: 4.8 or higher. For older kernels (e.g., 4.4.x), patches for the Intel Atom Processor E3900 Series platform are also available.
- Windows
 - Windows 10 IoT Enterprise 64-bit
- See also [Application Note Recommendations for a Robust Software Setup](#)
- For more information on supported operating system versions and drivers see [Software](#).

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