

RUGGED INDUSTRIAL BOX PC WITH INTEL ATOM PROCESSOR E3900 SERIES

- 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 slot for a SATA hard-disk/solid-state drive can be provided within the housing as an option in a special product version.

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

The BC51M comes with an integrated 30W wide-range DC/DC converter compliant with EN 50155 (nominal input voltages 24 and 36 V). The 24 V DC version is prepared for ISO 7637-2 (E-mark for automotive). 72 V DC and 110 V DC nominal input voltage is available as an option and designed for onboard rail applications.

In the 24 V DC version, 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. A multitude of other I/O is available at the front, including two Gigabit Ethernet, one USB 2.0 and one HD audio. Two slots are available for legacy serial I/O (RS232), CAN bus, MVB or IBIS as options.

LONG-TERM AVAILABLE AND FUTURE-SAFE

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

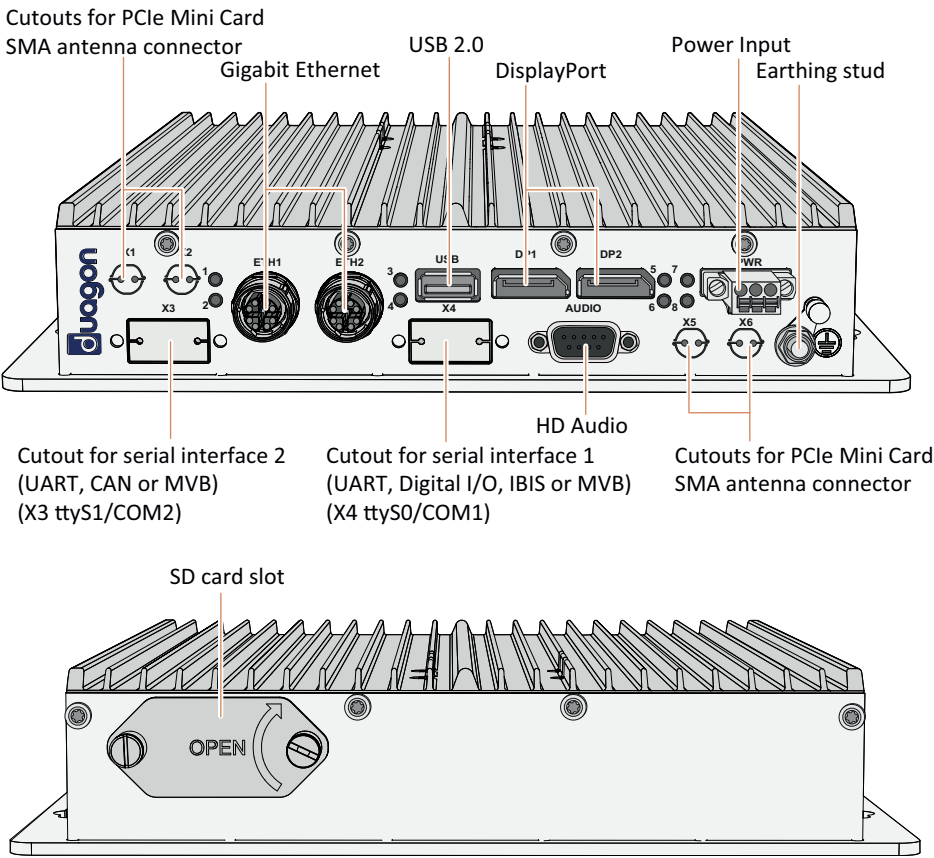


www.duagon.com/products/bc51m/

DATA SHEET

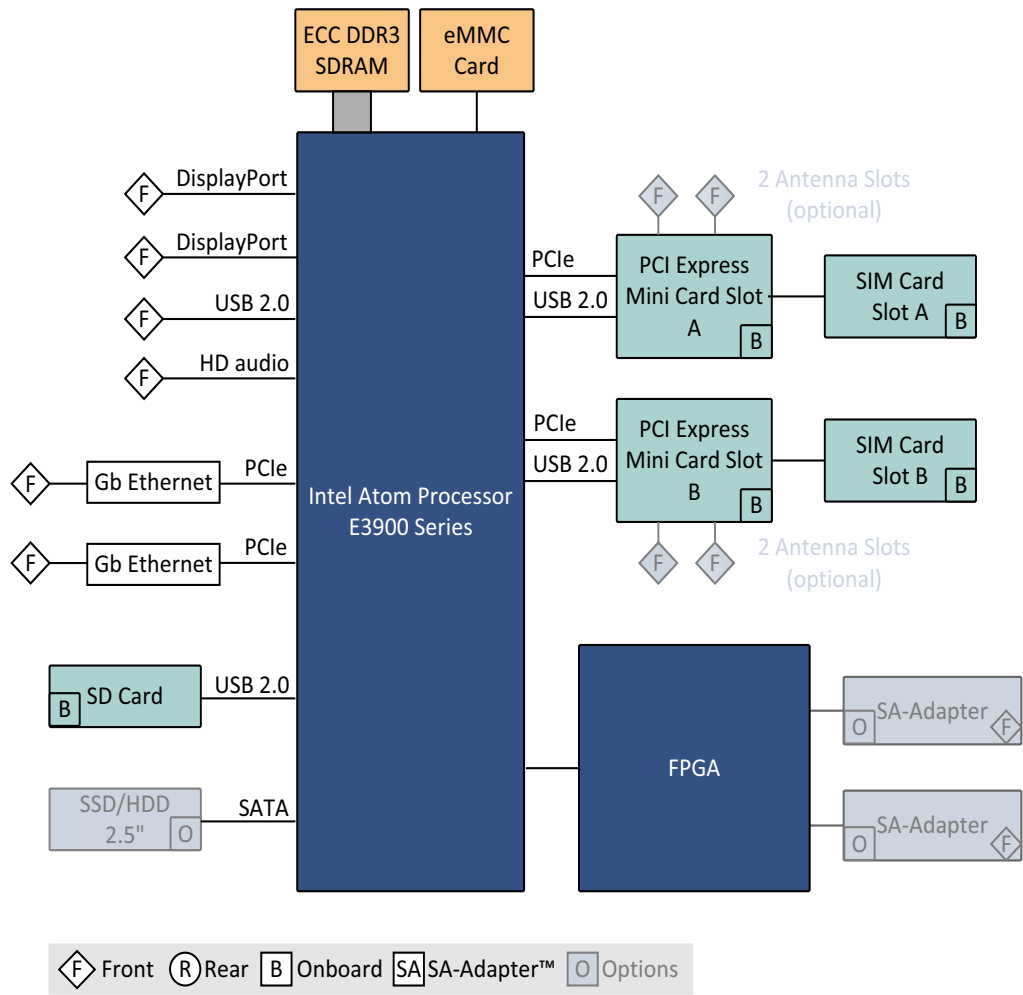


BC51M | DIAGRAM





BC51M | DIAGRAM





BC51M | TECHNICAL DATA

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, ECC
 - 8 GB max.

SECURITY

- Trusted Platform Module 2.0

MASS STORAGE

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

GRAPHICS

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

WIRELESS FUNCTIONALITY

- Possible functions:
 - LTE
 - WLAN
 - GNSS

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
- SATA
 - 1 × SATA Revision 1.x, board to board
- Video
 - 2 × DisplayPort 1.2, DisplayPort, for service
- Audio
 - 1 × D-Sub, 9-pin, plug
 - S/PDIF output
 - Stereo line input, single-ended
 - Stereo line output, differential
- USB
 - 1 × USB 2.0, Type A, for service
- Ethernet
 - 2 × 10/100/1000BASE-T, M12, X-coded, receptacle
- PCI Express Mini Card
 - 2 × PCI Express Mini Card slot
 - Slot 1: PCIe Full-Mini; PCIe x1, USB 2.0
 - Slot 2: PCIe Full-Mini; PCIe x1, USB 2.0
- SIM card
 - 2 × micro-SIM, internally accessible
- LED
 - Status: board status (BMC), power status
 - User configurable: 2 ×
 - Ethernet: activity, link
- Cutout
 - D-Sub options: RS232, RS422, RS485, CAN bus, digital I/O, IBIS Master, IBIS Slave, MVB
 - Antenna connector options: QLS receptacle, RP-SMA receptacle, SMA receptacle
- Power
 - 1 × power in, COMBICON, 3-pin, plug
 - Ignition input (24 V DC version)
- Earthing connection
 - M4 stud



SUPERVISION AND CONTROL

- Board management controller
- Temperature measurement
- System watchdog timer (BMC)
- Ignition watchdog timer
- Real-time clock, buffered by supercapacitor (3 days)

ELECTRICAL SPECIFICATIONS

- Supply voltage
 - 110 V DC nom. (EN 50155)
 - 72 V DC nom. (EN 50155)
 - 24 V DC to 36 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/flat surface
 - Rack in 19" cabinet
- Cooling: Air cooling, natural convection, airflow 0.4 m/s
- Protection rating: IP20

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 % RH 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
 - Interruption of voltage supply: 10 ms (EN 50155:2017, class S2)
 - General compliance with power supply requirements of EN 50155:2017
- 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

RELIABILITY

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

BIOS/BOOT LOADER

- AMI Aptio UEFI Firmware

SOFTWARE SUPPORT

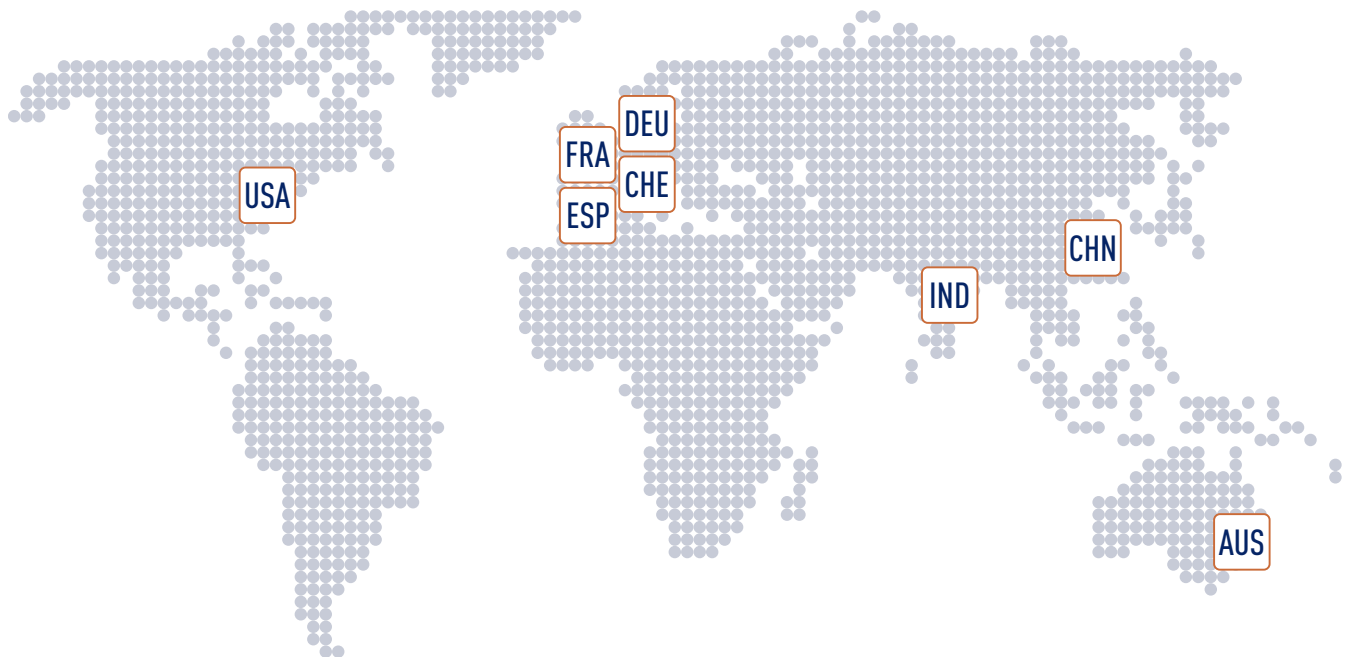
- Linux
 - Supported kernel: 4.8 or higher. For older kernels (e.g., 4.4.x), patches for the Intel Atom Processor E3900 Series platform are also available.
 - Driver support



- Windows
 - Windows 10 IoT Enterprise 64-bit
- ▶ See the product User Manual for details on software support: www.duagon.com/products/bc51m/#doc
- ▶ See also **Application Note Recommendations for a Robust Software Setup**
- ▶ See section Software on the product web page for available packages:
www.duagon.com/products/bc51m/#downl



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