

INDUSTRIAL COMPUTER FOR TRANSPORTATION WITH INTEL ATOM PROCESSOR E3900 SERIES



- Intel Atom E3900 series
- Up to 8 GB DDR3 DRAM soldered, ECC
- 1 HDD/SSD shuttle
- 4 Gb Ethernet ports
- 4 PCI Express Mini Card slots with micro-SIM slots
- WLAN, 4G LTE, GPS or GLONASS
- 2 USB 2.0, 2 DisplayPort, 1 CAN, 4 UARTs
- 24 and 36 VDC nom. class S2 PSU, with ignition
- -40 °C to +70 °C (+85 °C), fanless
- Conformal coating of internal components
- EN 50155 compliant (railways)
- Prepared for ISO 7637-2 (E-mark for automotive)



FOR IOT OR STORAGE-INTENSIVE APPLICATIONS

The BL51E is a fanless, maintenance-free box computer for embedded applications in transportation, e.g., in trains, buses or commercial vehicles. Its HDD/SSD shuttle provides the storage capacity necessary for entertainment servers or video surveillance systems. A vast number of I/O functions and options seamlessly link the BL51E to the IoT, making vehicles smart.

A MULTI-TALENT FOR WIRELESS COMMUNICATION

The BL51E can take over typical on-board wireless functions, whether it is an Internet connection for passengers or locating the vehicle. A GNSS positioning interface is available. Four PCI Express Mini Card slots each with two micro-SIM slots and dual SIM support provide maximum flexibility in implementing mobile service standards up to 4G LTE or WLAN/WLAN IEEE 802.11, and derivatives.

SOLID PROCESSING PERFORMANCE

The BL51E is powered by an Intel Atom E3950 running at 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 up to 8 GB DDR3 SDRAM and offers an SD card and a SATA HDD/SSD shuttle both accessible at the rear, plus in-system eMMC memory.

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 rugged aluminum

housing with cooling fins serves as a heat sink for the internal electronics and provides conduction cooling.

A MULTITUDE OF I/O

The BL51E supports two DisplayPort interfaces with maximum 4K resolution, four Gigabit Ethernet, two with PoE+ capability, two USB 2.0, legacy serial I/O (RS232) and CAN bus, general purpose inputs and relay outputs.

RAILWAY-COMPLIANT PSU WITH IGNITION FUNCTION

The BL51E has a class S2 wide range power supply in compliance with EN 50155 and prepared for ISO 7637-2 (E-mark for automotive). Standard versions support 24 V DC nominal voltage (10 V to 50.4 V), 110 V DC nominal voltage is available as an option. In the 24 V DC version, power can be switched on and off using an ignition signal on the power connector, and a run-down time after switching off the ignition signal can be adjusted by software.

LONG-TERM AVAILABLE AND FUTURE-SAFE

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

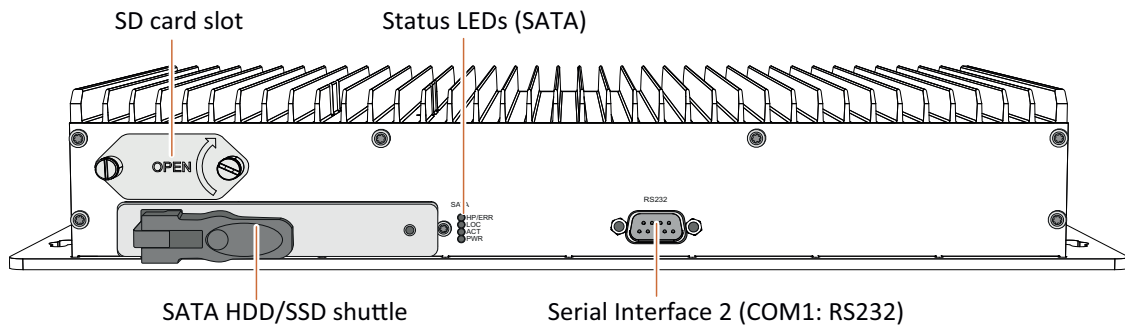
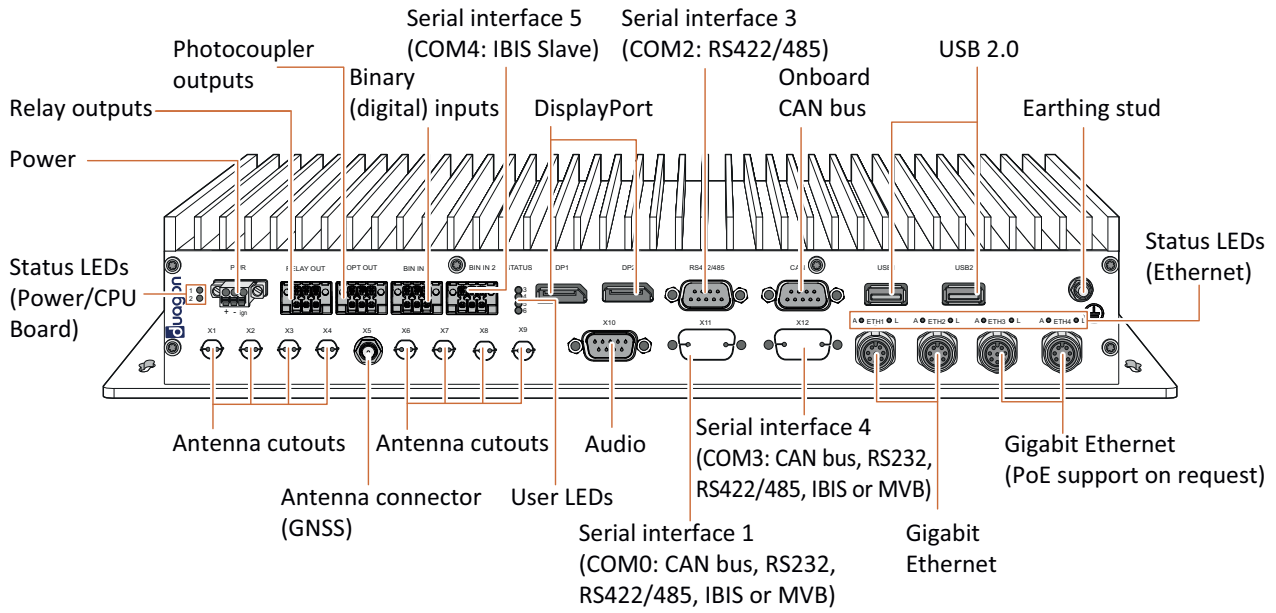


www.duagon.com/products/bl51e/

DATA SHEET

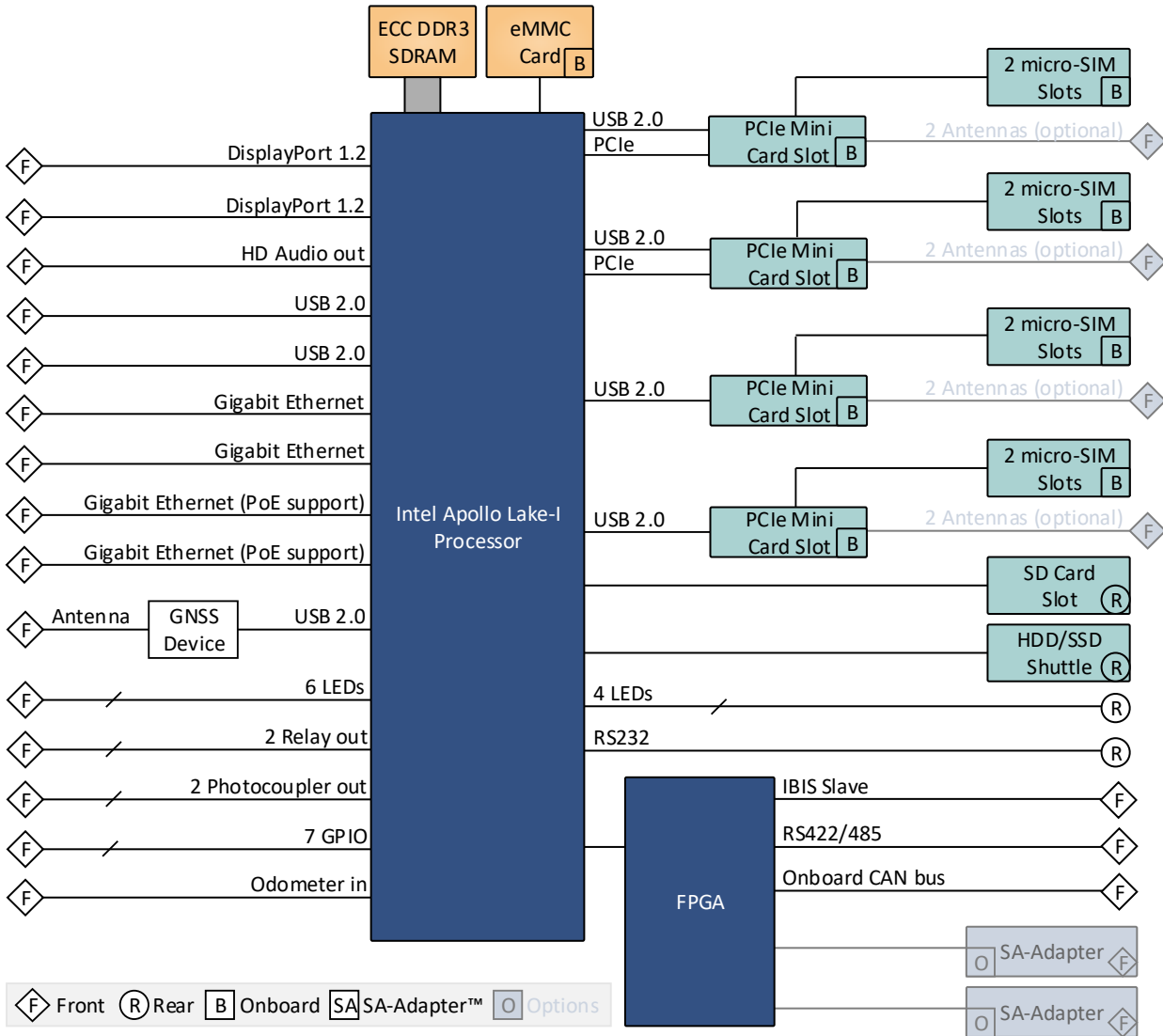


BL51E | DIAGRAM





BL51E | DIAGRAM





BL51E | 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 x5-E3940, 4 cores, 4 threads, 1.6 GHz, 1.8 GHz Turbo Boost, 9.5 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.

MASS STORAGE

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

GRAPHICS

- Processor graphics
- Maximum resolution: 4096 × 2160 pixels @ 60 Hz, 24 bpp (DisplayPort 1.2a)

WIRELESS FUNCTIONALITY

- Possible functions:
 - GNSS
 - LTE
 - WLAN

FIELD BUS FUNCTIONALITY

- Possible functions:
 - CAN bus
 - MVB

POWER OVER ETHERNET

- PSE (Power Sourcing Equipment)
- Supply classes 0, 1, 2, 3, 4
- Number of ports: 2

- Total power available: 30.8 W

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"; SATA Revision 2.x; externally accessible (shuttle)
- SD/microSD card slot
 - 1 × SD card; UHS-I (104 MB/s (SDR104)); externally accessible
- Video
 - 2 × DisplayPort 1.2
- Audio
 - 1 × D-Sub, 9-pin, plug
 - S/PDIF output
 - Stereo line input, single-ended
 - Stereo line output, differential
- USB
 - 2 × USB 2.0, Type A
- Ethernet
 - 4 × 10/100/1000BASE-T, M12, X-coded, receptacle
- Wireless
 - GNSS antenna connector: 1 × SMA receptacle
- PCI Express Mini Card
 - 4 × 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
 - Slot 3: PCIe Full-Mini; USB 2.0
 - Slot 4: PCIe Full-Mini; USB 2.0
- SIM card
 - 8 × micro-SIM, internally accessible



- Digital I/O
 - 2 × relay output, isolated, PCB plug, 6-pin
 - 2 × photocoupler output, isolated, PCB plug, 6-pin
 - 7 × digital input, isolated, PCB plug, 6-pin
 - 1 × odometer input, isolated, PCB plug, 6-pin
- Serial
 - 1 × RS232, non-isolated, D-Sub, 9-pin, plug
 - 1 × RS422/RS485, isolated, D-Sub, 9-pin, receptacle
- IBIS
 - 1 × IBIS Slave, isolated, PCB plug, 6-pin
- CAN bus
 - 1 × CAN non-isolated, D-Sub, 9-pin, plug
- LED
 - Status: board status (BMC), power status
 - Ethernet: activity, link
 - User configurable: 4 ×
- Cutout
 - D-Sub options: audio, CAN bus, RS232, RS422, RS485, digital I/O, IBIS Master, MVB
 - Antenna connector options: QLS receptacle, RP-SMA receptacle, SMA receptacle
- Power
 - 1 × power in, COMBICON, 3-pin, plug
 - Ignition input
- Earthing connection
 - M4 stud

SUPERVISION AND CONTROL

- Board management controller
- Temperature measurement
- System watchdog (BMC)
- Ignition watchdog
- Real-time clock, buffered by supercapacitor (3 days)
- Trusted Platform Module 2.0

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.
- Isolation voltage: 1500 V AC

MECHANICAL SPECIFICATIONS

- Dimensions: (W) 390 mm, (D) 215 mm, (H) 66 mm
- ▶ See the duagon website for technical product drawings including the exact dimensions of BL51E: www.duagon.com/products/bl51e/#doc
- Weight: 4.25 kg approx., 5.5 kg approx. (box PC in 19" insertion frame)
- Mounting
 - Wall/flat surface
 - Rack 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: +3000 m max. (EN 50125-1:2014, class AX)
- 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
 - 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 ISO 13732-1:2008
- Fire protection: EN 45545-2:2013 + A1:2015, HL1
- EMC emission: EN 50121-3-2:2016 + A1:2019
- EMC immunity: EN 50121-3-2:2016 + A1:2019
- 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

- Fire protection: ECE R118 Rev.2 + Amend.1
- EMC emission: ECE R10 Rev.5
- EMC immunity: ECE R10 Rev.5

RELIABILITY

- MTBF: 186 024 h predicted @ 40 °C according to IEC/TR 62380 (RDF 2000)

BIOS/BOOT LOADER

- AMI Aptio UEFI Firmware

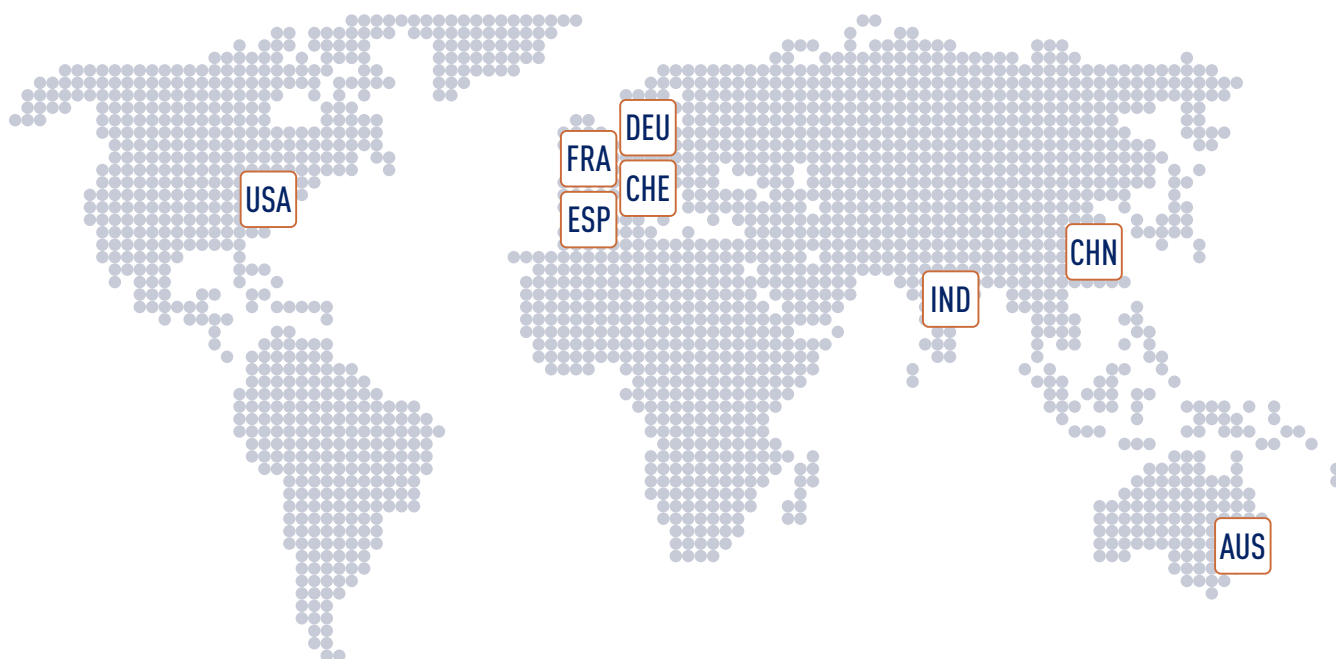
SOFTWARE SUPPORT

- 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
 - Tool support
- Windows
 - Windows 10 IoT Enterprise 64-bit
 - Driver support
 - Tool support
- See the product User Manual for details on software support: www.duagon.com/products/bl51e/#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/bl51e/#downl

BL51E | ORDERING INFORMATION

STANDARD MODELS

- | | |
|------------------|--|
| 09BL51E10 | Intel Atom x7-E3950, 1.6 GHz, 8 GB DDR3 DRAM, ECC, 32 GB eMMC, 24 VDC and 36 VDC nom. (10 V to 50.4 VDC) class S2 PSU with ignition, -40 °C to +85 °C, conformal coating, compliant to EN 50155, prepared for ISO 7637-2 (E-mark for automotive) |
| 09BL51E11 | Intel Atom x7-E3950, 1.6 GHz, 8 GB DDR3 DRAM, ECC, 32 GB eMMC, 110 VDC nom. (66 V to 154 VDC) class S2 PSU, -40 °C to +85 °C, conformal coating, compliant to EN 50155 |



duagon | WORLDWIDE

duagon has a global presence with support and sales representatives across 8 countries. With three decentralized engineering and production sites, our customers take advantage of the added competence and flexibility.

www.duagon.com

SWITZERLAND (HQ)

Dietikon
Phone +41 44 743 73 00
sales@duagon.com

AUSTRALIA

Artarmon
Phone +61 2 9966 9424
sales-aus@duagon.com

CHINA

Shanghai
Phone +86 159 0077 2985
sales-chn@duagon.com

FRANCE

Gaillard
Phone +33 450 955 312
sales-fra@duagon.com

GERMANY

Nuremberg
Phone +49 911 99 335 0
sales-deu@duagon.com

INDIA

New Delhi
Phone +91 11 41 61 12 48
sales-ind@duagon.com

SPAIN

Madrid
Phone +34 917 880 610
sales-esp@duagon.com

USA

Blue Bell
Phone +1 215 542 9575
sales-usa@duagon.com