

# MC50M

## DIN-Rail Computer with Intel Atom Processor for Rolling Stock Embedded System for IoT, Network Security and Predictive Maintenance

- » Intel Atom E3900 series
- » Up to 8 GB DDR3 RAM with ECC
- » Trusted Platform Module
- » M.2 NVMe slot for storage
- » Gb Ethernet, USB 3.0, RS232, RS485/422, DisplayPort
- » DIN rail, wall or 19" rack mounting
- » Input voltage 24 V DC nom. with ignition
- » Full range power supply 16 V DC to 60 V DC
- » EN 50155 compliant (railways)
- » -40 °C to +70 °C (+85 °C), fanless



### Low Power CPU for IoT/Network Applications

The MC50M is a modular computer for embedded applications in transportation, e.g., trains, buses or commercial vehicles. The computing platform features an Intel Atom E3900 series CPU with low power dissipation and scalability in performance and memory. The MC50M is the ideal basis for functions such as security gateway, predictive maintenance, CCTV or ticketing system, or to act as a diagnostics server.

### Modular System for Easy Configuration

The MC50M can be a stand-alone product, but due to MEN's modular concept it offers flexible built-to-order configurations. The box can be easily combined with prefabricated extension modules, providing additional features and short delivery times. In the modular system, the data transfer between the modules as well as the power distribution between the individual modules takes place via the extension connectors standardized by MEN. Extension modules can provide application-specific functions like wireless communication (LTE advanced, WLAN, GNSS), MVB, CAN bus, or other I/O. A removable storage shuttle can support the integration of a 2.5" SATA HDD/SSD. With a PSU extension module, ultra wide range isolated power supply from 24 V DC to 110 V DC nominal (EN 50155) is available.

### Power Saving Design and Security Features

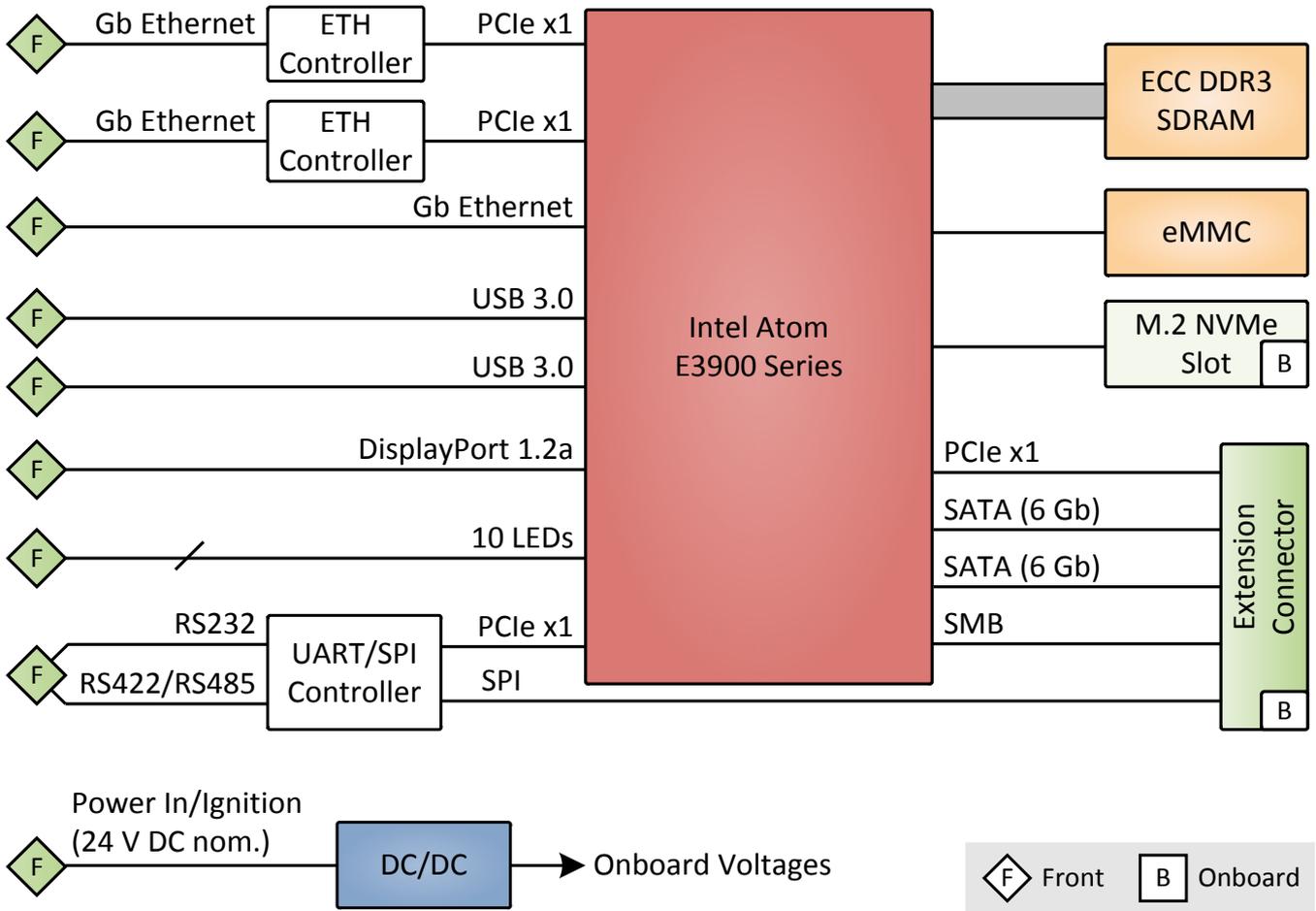
The board management controller provides enhanced reliability and reduced downtime. The Trusted Platform Module supports security and encryption features. With the ignition switch for remote control of booting and shutdown, the platform provides additional features for power saving.

### Flexible System Installation

Various mounting options facilitate the integration of the box into an existing environment. The standard 35 mm DIN Rail mounting offers space saving mounting of all system modules on a single rail. Wall mounting and mounting in a 19" rack using adaption brackets are an option. The aluminum housing with cooling fins allows fanless operation. MC50M has no moving parts, making it maintenance free.

### Rolling Stock Qualified and Long-Term Availability

The CPU module is qualified for rolling stock and wayside applications. Long term availability until 2027 minimizes life-cycle management by making the MC50M available at least for this period of time.



**Diagram**



**CPU**

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

**Memory**

- System RAM
  - Soldered DDR3, ECC
  - 8 GB max.

**Security**

- TPM (Trusted Platform Module 2.0)

**Mass Storage**

- The following mass storage devices can be assembled:
  - SSD M.2 (NVMe)
- The following mass storage devices are assembled:
  - eMMC (soldered); 64 GB max.

**Graphics**

- Processor graphics
- Maximum resolution: 4096 x 2160 pixels @ 60 Hz, 24 bpp

**Interfaces**

- SSD/HDD slot
  - 1x M.2 2242/2260/2280 socket 3 Key M; NVMe, PCIe x1; internally accessible
- Video
  - 1x DisplayPort 1.2a
- USB
  - 2x USB 3.0, Type A
- Ethernet
  - 3x 10/100/1000BASE-T, M12, X-coded, receptacle
- Serial
  - 1x RS232, isolated, D-Sub, 9-pin, plug
  - 1x RS422/RS485, isolated, D-Sub, 9-pin, plug
- LED
  - Status: board status (BMC), power status
  - Ethernet: link, activity
  - User configurable: 2x
- Power
  - 1x power in, M12, A-coded, plug
  - Ignition input
  - Earthing connection: M4 screw

**Supervision and Control**

- Board management controller
- Temperature measurement
- Watchdog timer
- Real-time clock, buffered by supercapacitor (5 days)

**Electrical Specifications**

- Supply voltage
  - 24 V DC nom.
  - 48 V DC nom.
- Power consumption
  - 10 to 15 W typ.
  - The power consumption depends on the CPU type and CPU load.
- Inrush current I<sub>2t</sub>
  - tbd

**Mechanical Specifications**

- Dimensions
  - (W) 42 mm, (D) 144 mm, (H) 132 mm
- Weight: 760 g approx.
- Mounting possibilities
  - DIN rail
  - Wall-mount
  - Rack-mount 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: +3000 m max. (EN 50125-1:2014, class AX)
- Pollution degree: EN 50124-1:2017, class PD3
- Humidity: +55 °C and +25 °C, 100 % RH max. (EN 50155:2017)
- Shock: 30 ms @ 50 m/s<sup>2</sup> (EN 61373:2010/AC:2017-09, vehicle body, cat. 1, class B)
- Vibration: 10 min @ 2.02 m/s<sup>2</sup> (functional) and 5 h @ 11.44 m/s<sup>2</sup> (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: 0 ms (EN 50155:2017, class S1)
- 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 PC2 (Any PCB protected on both sides)
- Useful life: 15 years (EN 50155:2017, class L3)

**Product Compliance: Rail  
- Wayside Non-Safety  
Related**

- Operating temperature: -40 °C to +70 °C (EN 50125-3:2003, class T2, cubicle, with class T2 maximum extended by 5 °C)
- Storage temperature: -40 °C (EN 60068-2-1:2007, Ab) to +85 °C (EN 60068-2-2:2007, Bb)
- Altitude: +3000 m max. (EN 50125-3:2003, class AX)
- Humidity: 100 % RH max. (EN 50125-2:2002, control cabinet, class T1/T2/TX)
- Shock: 11 ms @ 20 m/s<sup>2</sup> (EN 50125-3:2003, in a switch cabinet 1 m to 3 m from the track)
- Vibration: 2.3 m/s<sup>2</sup> (EN 50125-3:2003, in a switch cabinet 1 m to 3 m from the track)
- Electrical safety
  - EN 50124-1:2017
  - EN 62368-1:2014 + AC:2015
- EMC emission
  - EN 50121-4:2016
  - EN 61000-6-4:2007 + A1:2011
- EMC immunity
  - EN 50121-4:2016
  - EN 61000-6-2:2005

**Product Compliance:  
Road Vehicle**

- EMC emission: ECE R10 Rev.5
- EMC immunity: ECE R10 Rev.5

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## **Reliability**

- MTBF: 421 000 h predicted @ 40 °C according to IEC/TR 62380 (RDF 2000)

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## **BIOS**

- AMI Aptio UEFI Firmware

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## **Software Support**

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

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