

Single Board Computer

ALF51 - 1.8" SBC

Datasheet v1.0



ALF51 is a 1.8" Single Board Computer based on the Intel Atom® Processor E3900 Series, ideal for many space-critical and thermally demanding applications, including robotics, industrial automation and medical devices.

As small as a credit card (84 x 55 mm), the ALF51 is designed with 30% extended process capability and low power consumption of an average of 9W TDP thus providing energy efficiency. Thanks to the fanless design and its industrial-grade features that support extended temperature range of up to -40 to 85°C and 12VDC, the ALF51 SBC provides reliable performance even under harsh conditions whilst ensuring long-term service life up to 15 years.

Despite its small form-factor, the ALF51 SBC is fully equipped with various I/O ports such as 2 Intel GbE, 1 COM, 2 USB 3.1 Gen 1 and 1 USB 2.0. The ALF51 is especially designed as an IoT gateway with dual GbE, where one GbE can be connected to the network server and the other GbE to the respective device, e.g. an I/O controller or a camera that receives and transmits data. It also supports the Mini-PCIe expansion for WIFI / BT and 3G/4G in IoT solutions.

Key Features:

- Intel Atom® Processor E3900 Series
- Single Channel LPDDR4 Memory Down up to 4GB
- Mini DP++ resolution supports up to 4096x2160 @ 60Hz
- Comprehensive I/O: 2 Intel GbE, 1 COM, 2 USB 3.1 Gen 1, 1 USB 2.0
- Expansion and Storage: 1 Mini PCIe, 1 SMBus
- 15 year CPU lifetime of support until Q4'31 (Based on Intel IOTG Roadmap)

ALF51 - 1.8" SBC

CPU Core

Feature	Specification
CPU	Intel Atom® Processor E3900 Family, BGA 1296 Intel Atom® x5-E3940 Processor, Quad Core, 2M Cache, 1.6GHz (1.8GHz), 9.5W Intel Atom® x5-E3930 Processor, Dual Core, 2M Cache, 1.3GHz (1.8 GHz), 6.5W Intel® Pentium® Processor N4200, Quad Core, 2M Cache, 1.1GHz (2.5GHz), 6W Intel® Celeron® Processor N3350, Dual Core, 2M Cache, 1.1GHz (2.4GHz), 6W
RAM	2GB / 4GB DDR4 Memory Down Single Channel LPDDR4 2400MHz
Primary Storage	1 x 16GB / 32 GB/ 64GB eMMC
BIOS	Insyde SPI 128Mbit (supports UEFI boot only)

Graphics

Controller	Intel® HD Graphics
Feature	OpenGL 4.2, Direct X 11.1, OpenCL 1.2, OGL ES 3.0 HW Decode: H.264, MPEG2, VC1, VP8, H.265, MPEG4 HW Encode: H.264, MPEG2, MPEG4
Display	1 x Mini DP ++ Mini DP ++: resolution up to 4096x2160 @ 60Hz

Extension

Interface	1 x full-size Mini PCIe (PCIe / USB 2.0, optional USB 3.1 Gen1 / USB 2.0)
------------------	---

Ethernet

Controller	2 x Intel® I211AT PCIe (10/100 / 1000Mbps) or 2 x Intel® I210IT PCIe (10/100 / 1000Mbps)
-------------------	---

I/O

Rear	
Ethernet	2 x GbE (RJ-45)
USB	2 x USB 3.1 Gen 1
Display	1 x Mini DP ++

ALF51 - 1.8" SBC

Feature	Specification
Internal	
Serial	1 x RS-232/422/485 (1.27mm pitch)
USB	1 x USB 2.0 (1.27mm pitch)
DIO	1 x 8-bit DIO
SMBus	1 x SMBus

Watchdog Timer and Safety

Output and interval	System reset, programmable via software from 1 to 255 seconds
TPM	fTPM 2.0

Electrical, Mechanical and Environmental Specifications

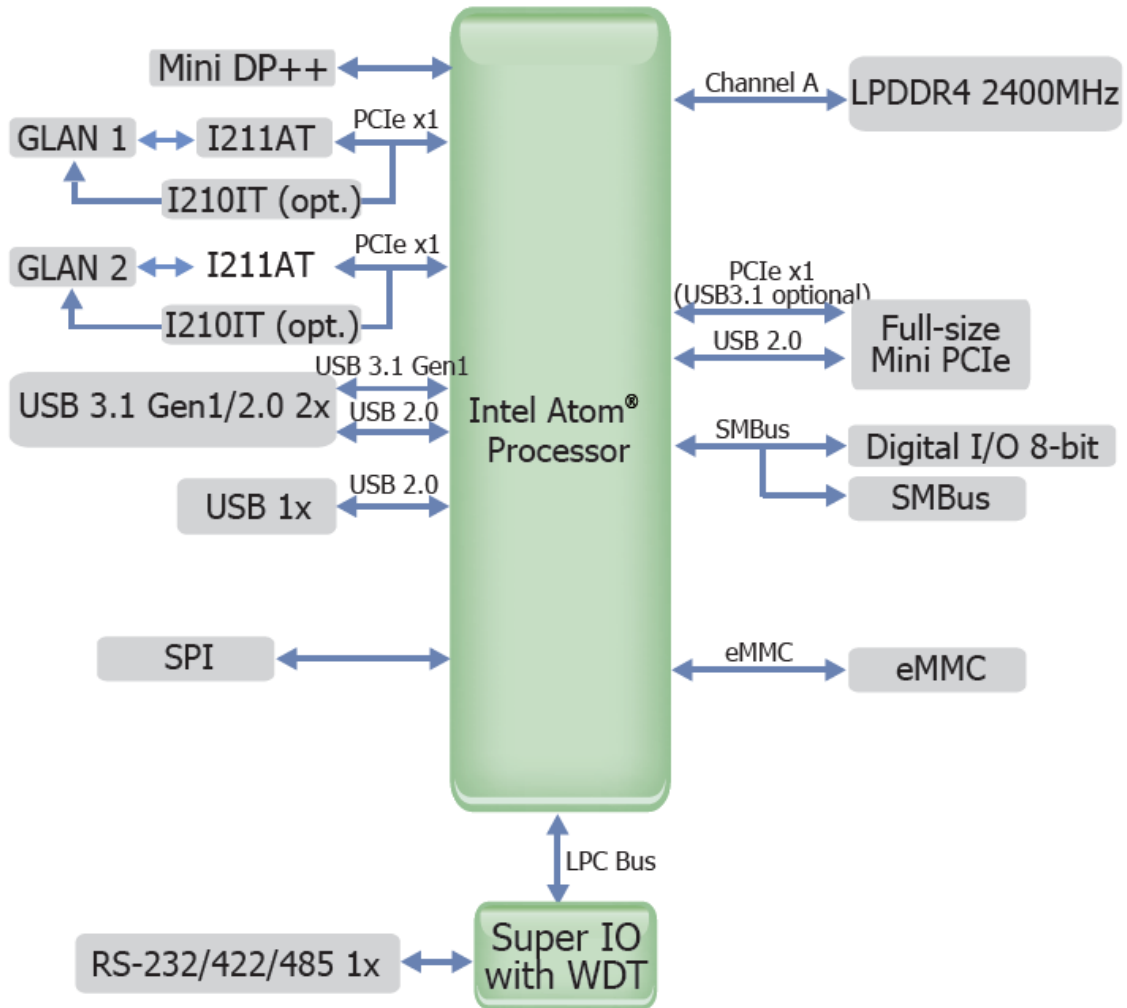
Supply Voltage	Single 12V +/- 10% DC
Connection	2-pin terminal block
Power Consumption	Typical: E3940: 12V @ 0.29A (3.48Watt) Max: E3940: 12V @ 1.30A (15.6Watt)
RTC Battery	CR2032 Coin Cell
Dimensions	1.8" SBC Form Factor: 84mm (3.31") x 55mm (2.17 ")
Height	PCB: 1.6mm Top Side: 15mm Bottom Side: 8mm
Operating temperature	Commercial: 0° to 60° C Extended: -20° to 70° C Industrial: -40° to 85° C.
Storage temperature	-40 to 85°C
Relative humidity	5% to 90% (operating) 5% to 90% (storage)
MTBF	868.962 hrs @ 25 ° C; 638.889 hrs @ 45 ° C; 465.382 hrs @ 60 ° C
Certifications	CE, FCC, RoHS

Software

BSP	Full Board Support Package and ready-to-run images
OS Support (UEFI only)	Windows 10 IoT Enterprise 64-bit Linux

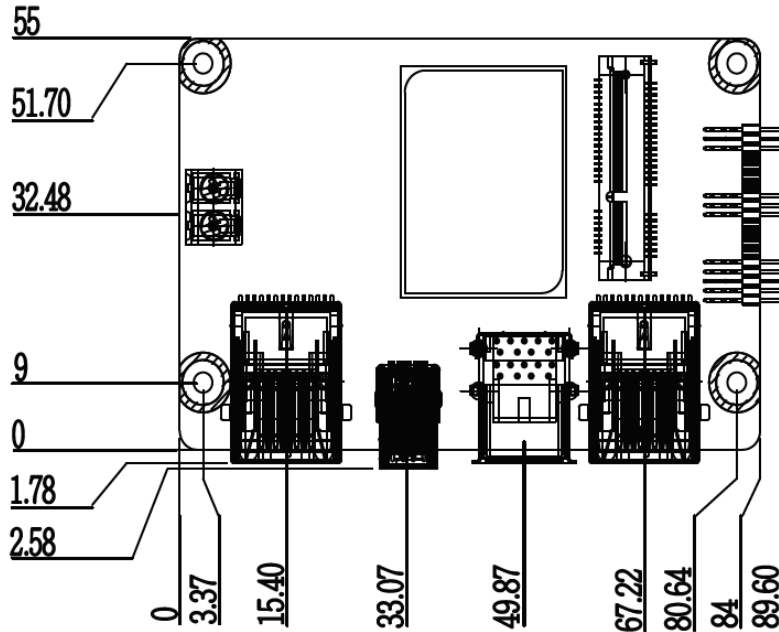
ALF51 - 1.8" SBC

Block Diagram

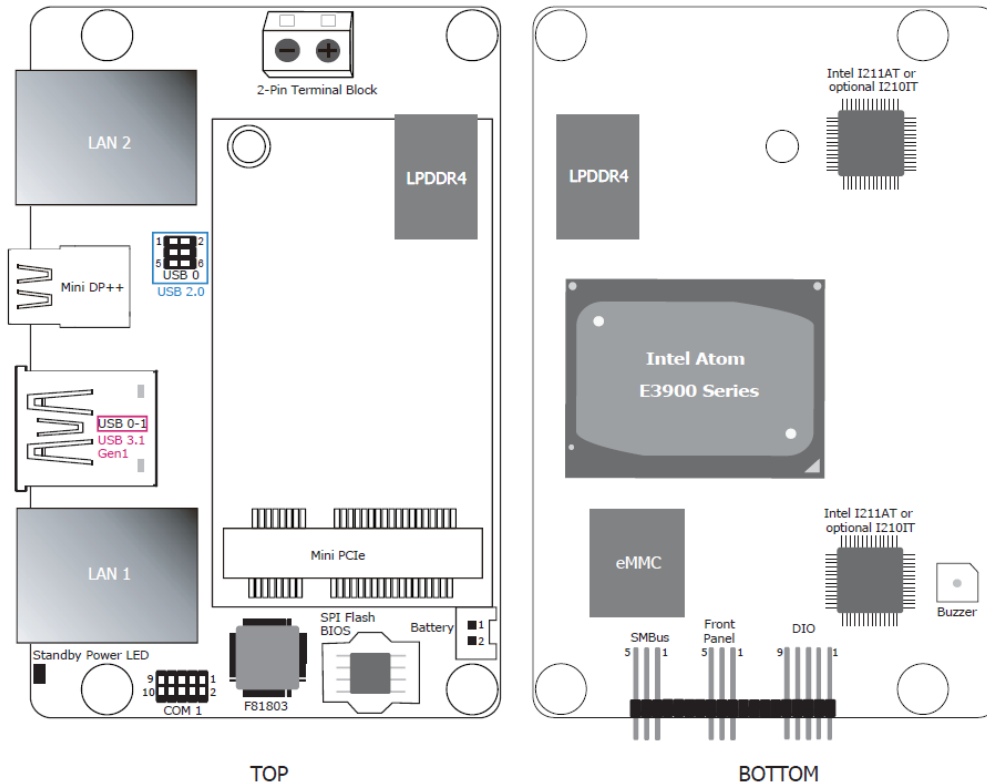


ALF51 - 1.8" SBC

Mechanical Drawings



Board Layout



ALF51 - 1.8" SBC

ALF51 Packing list

- 1 ALF51 board
- 1 USB port cable (Length: 200mm)
- 1 COM port cable (Height: 300mm)
- 1 Heat spreader (Height: 11mm)

Optional Items

- Heat sink for E series CPU 0 to 60°C / wide temp(Height: 27mm)
- Heat sink for N series CPU 0 to 60°C (Height: 23mm)
- Power adapter (60W, 12V, DC jack)
- 2 pole terminal to DC Jack cable