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EK02 - ESM Starter Kit with PowerPC MPC8245

- **Computing module ESM EM04N:**
  - **PowerPC MPC8245/400MHz**
  - **256MB SDRAM, CompactFlash slot**
  - **2 Fast Ethernet, 2 COMs (front)**
- **FPGA with additional I/O:**
  - **Graphics, CAN, quad UART, SPI, IDE**
- **Carrier card EC01 (ATX-compatible format):**
  - **1 ESM slot, 3 PCI slots**
  - **USB, serial, IDE, SA adapter connectors**
  - **TFT, VGA, touch connectors**
- **Accessories:**
  - **External PSU, PCI-104 adapter**
  - **VGA cable, RJ45 to D-Sub cable**

Embedded System Modules are complete computers on a module. A final ESM-based embedded application consists either of a stand-alone ESM (the power supply connection being sufficient to operate the module), an ESM with an application-specific carrier card and/or an ESM with additionally plugged PCI-104 modules.
The EK02 is a starter kit that allows evaluation of the functions of the EM04N Embedded System Module. The kit consists of the standard CPU module, an FPGA loaded with additional I/O functions, the carrier card with I/O connectors, DRAM memory, an external PSU, VGA and RJ45 to D-Sub cables, and an adapter for mounting a PCI-104 module. The EK02 provides versatile mounting options and can also be installed in a standard PC (including a PCI-104 module).
After evaluation, the design overhead for each application is limited to I/O. Depending on the application and quantity it may be necessary to develop a simple carrier card, choose PCI-based standard components, load additional or different I/O functions into the FPGA, write software drivers for those additional functions, or design a housing. This minimal additional design effort can be carried out by the user or by MEN.

The EM04N is an ideal computer for low-cost deeply embedded solutions in very harsh environments, for machine control, Man-Machine Interfaces, fieldbus bridges or embedded Linux PCs. It is controlled by an MPC8245 PowerPC at 400MHz (incl. FPU, MMU). The EM04N provides 256MB DRAM for data storage and a CompactFlash slot for program storage. It comes with two RS232 interfaces and two Fast Ethernet channels at its front panel.
As an evaluation example, additional I/O functionality is implemented in the onboard FPGA, comprising a graphics controller with 800x600 resolution, a CAN controller, a quad UART as well as controllers for IDE and touch panel. The physical interfaces for these functions are accessible on the carrier board which is included in the kit.
The carrier board has an ATX-compatible format and provides the mechanical platform, the power supply and the I/O connectors. It comes with one ESM slot and three PCI slots, which allow the use of standard extension cards in the PC. It is equipped with USB (front), a 9-pin D-Sub for RS232 or RS422 or RS485 (front) and connectors for IDE, touch, TFT, VGA, and 4 SA adapters. The ESM carrier also features an I2C EEPROM for the board ID and revision information.

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Technical Data

EC01 ESM Carrier Card
- One ESM slot
- J1 and J2 assembled
- I/O connectors
  - USB 2.0
  - RS232/422/485 COM3 interface
  - IDE connector
  - Quad serial I/O interface (3 COM, 1 CAN)
  - TFT connector
  - Touch panel connector
  - VGA connector
- PCI interface
  - Three PCI slots
  - 33MHz, 32-bit data bus, 5V V-I/O
- Reset button and power LED

EM04N ESM Module
- CPU: PowerPC Kahlua II MPC8245 / 400MHz
- Memory
  - 256MB SO-DIMM SDRAM installed
  - CompactFlash interface
- Interfaces
  - Two 10/100Base-T Ethernet channels, RJ45 at front panel
  - Two UART RS232 serial interfaces (COM1/2), RJ45 at front panel
- Mass storage: Fast IDE ports for IDE devices (40-pin) and CompactFlash
- I/O Extension through FPGA
  - Accessible on EC01
  - CAN bus
  - Quad UART
  - TFT/VGA
  - Touch panel
- PCI Interface
  - 32-bit PCI interface at PCI-104 connector J1
  - Support of 4 external masters (3 PCI, 1 PCI-104)

Accessories
- External PSU
- VGA and RJ45 to D-Sub cables
- Adapter for mounting of one PCI-104 module

Electrical Specifications
- Supply voltage/power consumption:
  - EC01: +24V (12V..36V), 1.6A; +24V on pin 1, GND on pin 2
  - EM04N: +5V (4.85V..5.25V), 500mA
  - EM04N: +3.3V (3.0V..3.6V), 1A, w/o SO-DIMM; increases up to 1.6A depending on installed SO-DIMM
- MTBF EM04N: tbd. @ 50°C

Mechanical Specifications
- Dimensions of EC01 PCB: 170mm x 150mm
- EM04N conforming to ESM specification (PCB: 149mm x 71mm)
- Weight
  - EC01: 200g
  - EM04N: 100g

Environmental Specifications
- Temperature range (operation):
  - 0..+60°C
  - Industrial temperature range on request
  - Airflow: min. 10m³/h
- Temperature range (storage): -40..+85°C
- Relative humidity (operation): max. 95% non-condensing
- Relative humidity (storage): max. 95% non-condensing
- Altitude: -300m to + 3,000m
- Shock: 15g/11ms
- Bump: 10g/16ms
- Vibration (sinusoidal): 2g/10..150Hz

Safety
- PCB manufactured with a flammability rating of 94V-0 by UL recognized manufacturers

EMC
- Tested according to EN 55022 (radio disturbance), IEC1000-4-2 (ESD) and IEC1000-4-4 (burst) with regard to CE conformity

Software Support
- MENMON
- VxWorks
- Linux (ELinOS)
- QNX
- CANopen support: MEN Driver Interface System (MDIS for Windows, Linux, VxWorks, QNX, RTX, OS-9)

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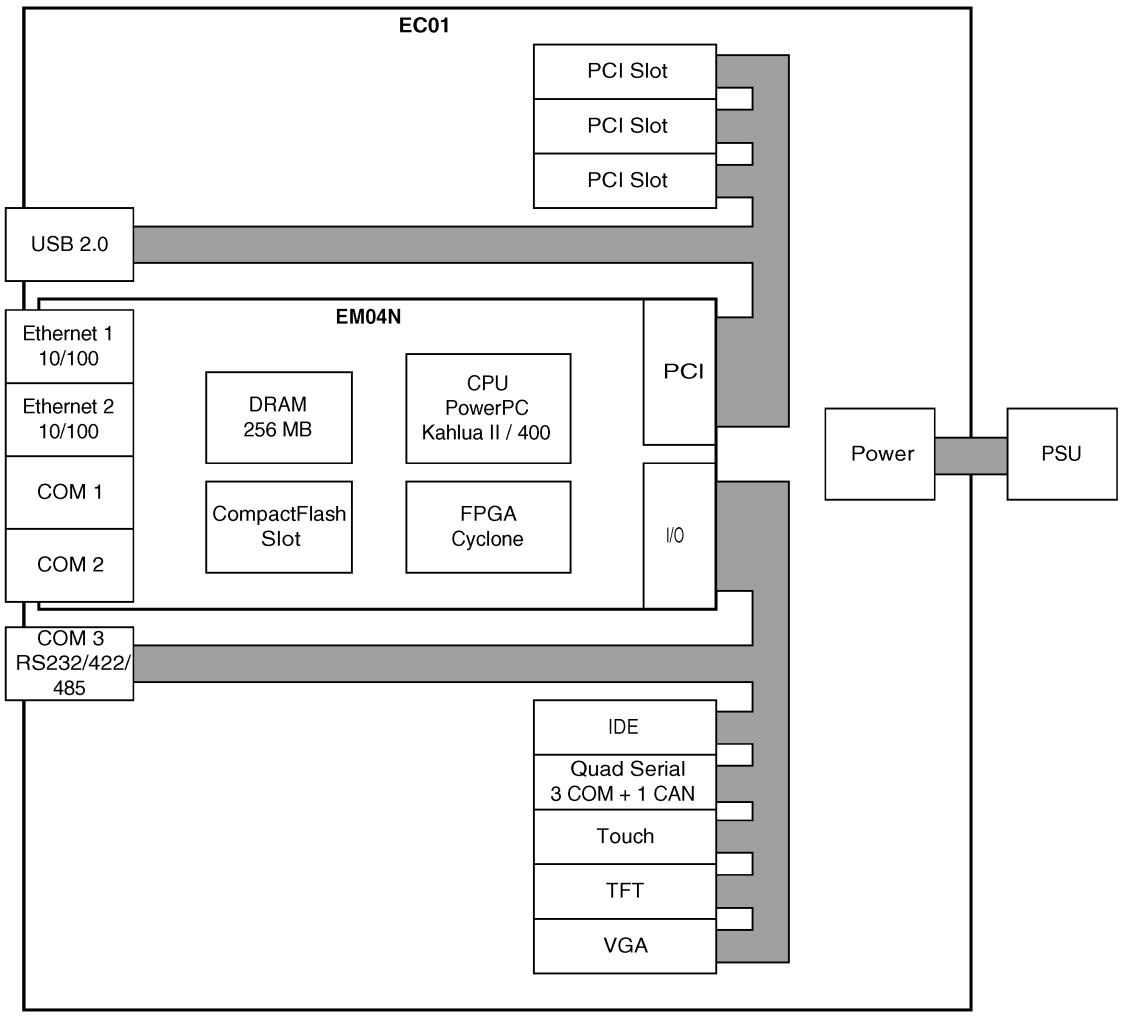
Diagram



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Related Products

Standard Hardware

08EK02-03	ESM evaluation kit: Mini ATX carrier board EC01 with 1 ESM slot, 3 PCI slots, floppy interface; ESM EM04N with PowerPC Kahlua II / 400MHz, 2MB Flash, 2 Fast Ethernet, 2 COMs, FPGA functions (graphics 800x600, CAN, quad UART, SPI, IDE); temperature range: 0..+60°C; incl. external PSU, RJ45 to D-Sub cable, VGA cable and adapter for mounting of one PCI-104 module - 256MB DRAM installed, CompactFlash not installed (08EK02-03 = EC01-00 + EM04N01)
15EM04N01	EM04N, ESM - Embedded System Module, PowerPC Kahlua II / 400MHz, 2MB Flash, CompactFlash slot, SO-DIMM DRAM slot, dual Fast Ethernet, 2 COMs, FPGA functions (graphics 800x600, CAN, quad UART, SPI, IDE, SRAM, GPIO); PCI-104 stackable; temperature range: 0..+60°C

Please refer to our ESM - Embedded System Modules compare chart for a selection of further single-board computers with different processors and on-board functionality.

FPGA IP Cores

This MEN board offers the possibility to add customized I/O functionality in FPGA. Every standard board comes with a preconfigured FPGA configuration. For additional functions already developed by MEN please refer to our FPGA IP Core overview. More IP cores that can be used in combination with MEN IP cores are available for example from www.altera.com or www.opencores.org. MEN also offers integration of existing and development ofnew (customized) IP cores. Depending on the hardware platform, SA adapters can be used to realize the physical lines - see below.

Accessories

0751-0006	CompactFlash card, 512MB, Type I, 0..+60°C
0751-0008	CompactFlash card, 64MB, Type I, 0..+60°C
0751-0009	CompactFlash card, 128MB, Type I, 0..+60°C
0751-0012	CompactFlash card, 256MB, Type I, 0..+60°C
0751-0018	CompactFlash card, 256MB, Type I, -40..+85°C
0752-0123	256MB DRAM 0..+60°C for 15EM04N01
0752-0158	512MB DRAM 0..+60°C for 15EM04N01
0752-0183	64MB DRAM 0..+60°C for 15EM04N01
08SA01-00	Serial interface adapter, RS232, not optically isolated, 0..+60°C
08SA02-00	Serial interface adapter, RS422/485, half duplex, optically isolated, 0..+60°C
08SA02-01	Serial interface adapter, RS422/485, full duplex, optically isolated, 0..+60°C

Related Products

08SA02-07	Serial interface adapter, RS422/485, full duplex, optically isolated, temperature range: -40..+85°C
08SA03-00	Serial interface adapter, RS232, optically isolated, 0..+60°C
08SA03-01	Serial interface adapter, RS232, optically isolated, -40..+85°C
08SA04-00	Serial interface adapter, TTY, optically isolated, 0..+60°C
08SA08-00	Serial interface adapter, CAN ISO high-speed, optically isolated, 0..+60°C

For more functions realized with SA adapters, see the listing on MEN's website. You can also view our SA adapter compare chart for a quick overview of different functions. Please contact sales to make sure that these SA adapters can be used in the board configuration you are looking for.

Software

10ABMX-20	ELinOS V.3.1 - Embedded Linux incl. RTAI real-time extension for PowerPC, English version. The Sysgo Development Kit includes the board support packages (BSPs) for MEN cards F1N, B11, A12, A15, D3, SC13, F6, EM04/N and PP01. The package includes 1 year ELinOS development support and all ELinOS updates and upgrades during this period for free. It additionally includes the BSP support for MEN hardware by MEN. --- N.B.: For correct handling of the ELinOS software support it is mandatory to sign and return the enclosed support agreement directly to Sysgo! The Sysgo support agreement is automatically prolonged for another year if not cancelled 3 months prior to expiration.
10ABMX-21	ELinOS V.3.1 - Embedded Linux incl. RTAI real-time extension for PowerPC, German version. The Sysgo Development Kit includes the board support packages (BSPs) for MEN cards F1N, B11, A12, D3, SC13, F6, EM04/N and PP01. The package includes 1 year ELinOS development support and all ELinOS updates and upgrades during this period for free. It additionally includes the BSP support for MEN hardware by MEN. --- N.B.: For correct handling of the ELinOS software support it is mandatory to sign and return the enclosed support agreement directly to Sysgo! The Sysgo support agreement is automatically prolonged for another year if not cancelled 3 months prior to expiration.
10EM04-60	VxWorks® Tornado 2.0.2..2.2.1/VxWorks® 5.4 .. 5.5.1 BSP for EM04 and EM04N

This board is an MEN product running Sysgo's ELinOS Embedded Linux. Sysgo provides full support for MEN hardware. Please contact www.sysgo.de.

13Z015-06	MDIS4/2004 low-level driver sources for MSCAN/Layer2
13Z016-06	MDIS4/2004 low-level CANopen driver (Master)

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Related Products

13Z016-70	MDIS4/2004 Windows® NT4/W2K driver for CANopen
14EM04-00	MENMON (Firmware) for EM04, EM04N (object code)

Documentation

20EK02-00	EK02 user manual
21APPN004	Application Note: ELinOS demo-em04-001, simple demo project for EM04
21APPN005	Application Note: ELinOS demo-em04-000, X-Window/RTAI demo project for EM04
21APPN006	Application Note: ELinOS demo-em04-002, simple demo project for EM04

For the most up-to-date ordering information and direct links to other data sheets and downloads, see the EK02 online data sheet under www.men.de. --> Click here!

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