

EK03 - ESM Starter Kit with Transmeta TM5900



Embedded System Modules are complete computers on a module. A final application consists either of a stand-alone ESM, an ESM with an application-specific carrier card and/or an ESM with additionally plugged PCI-104 modules.

The EK03 is a starter kit that allows evaluation of the functions of the ESM EM05. The kit consists of the CPU module, an FPGA with additional I/O functions, the carrier card, DRAM memory, PSU, VGA and RJ45 to D-Sub cables, and an adapter for mounting a PCI-104 module. The EK03 provides versatile mounting options and can also be installed in a standard PC.

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 I/O functions into the FPGA, write software drivers for those additional functions, or design a housing.

The EM05 is a powerful industrial PC designed to operate in harsh environments (-40 to +85°C, shock, vibration, humidity etc.) -- an ideal solution also for infotainment applications. It is controlled by the TM5900 from Transmeta, a Pentium®-like x86 with an integrated Northbridge. What makes this CPU attractive

- **Computing module ESM EM05:**
 - **TM5900 / 800MHz**
 - **512MB DRAM (DDR SO-DIMM), CompactFlash slot**
 - **2 Fast Ethernet, 2 COMs (front)**
 - **Keyboard/mouse, IDE, floppy (rear)**
- **FPGA with additional I/O:**
 - **Graphics, TFT, floppy, PS/2, IDE, COM2**
- **Carrier card EC01 (ATX-compatible format):**
 - **1 ESM slot, 3 PCI slots**
 - **USB, serial, IDE, floppy connectors**
 - **TFT, VGA**
- **Accessories:**
 - **External PSU, PCI-104 adapter**
 - **VGA cable, RJ45 to D-Sub cable**

is its low power consumption of typically 5W at 800MHz and a long-term availability of five years. The EM05 is equipped with 512MB DDR RAM (133MHz) and a CompactFlash slot for scalable program storage. It provides two RS232 interfaces and two Fast Ethernet channels via RJ45 connectors at its front panel.

Further I/O deriving from the onboard Super I/O controller such as USB, IDE, PS/2 etc. are routed to the I/O connector of the ESM by means of an FPGA. Additional I/O functionality is implemented in the onboard FPGA, comprising a graphics controller with 800x600 resolution and controllers for IDE, SPI and GPIO. The physical interfaces are accessible on the carrier board which is included in the kit.

The ATX-compatible carrier board 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, floppy, PS/2, TFT, and VGA. Optionally, the floppy can be replaced by 4 SA adapters. Thus, further serial lines and CAN would be available via FPGA on the carrier. The ESM carrier also features an I2C EEPROM for the board ID and revision information.

Technical Data

EC01 ESM Carrier Card

- One ESM slot
- J1 and J2 assembled
- I/O connectors
 - USB 2.0
 - IDE connector
 - PS/2 keyboard/mouse connector, via SA adapter
 - TFT connector
 - VGA connector
 - Floppy disk interface
 - RS232/422/485 COM interface (currently not supported)
- PCI interface
 - Three PCI slots
 - 33MHz, 32-bit data bus, 5V V-I/O
- Reset button and power LED

EM05 ESM Module

- CPU: Transmeta Crusoe TM5900 / 800MHz
- Memory
 - 64KB L1 and 512KB L2 Cache integrated in Crusoe CPU
 - 512MB SO-DIMM DDR RAM installed
- CompactFlash interface
- Flash 4MB
- Serial EEPROM 4kbit for factory settings
- Interfaces
 - Two 10/100Mbps/s Ethernet channels, RJ45 at front panel
 - Two UART RS232 serial interfaces (COM1/COM2), RJ45 at front panel
 - One UART RS232 serial interface (COM3), via EC01 (currently not supported)
- Mass storage: Fast IDE ports for IDE devices (40-pin, via EC01) and CompactFlash
- I/O Extension
 - Accessible on EC01
 - Keyboard
 - Mouse
 - TFT/VGA
 - Floppy
 - COM3 (currently not supported)
- PCI Interface
 - 32-bit/33-MHz PCI interface at PCI-104 connector J1
 - Support of 4 external masters

Accessories

- External PSU
- Adapter for mounting of one PCI-104 module
- VGA cable (15-pin HD-Sub)
- RJ45 to 9-pin D-Sub cable
- Keyboard/mouse Y-cable
- SA13 PS/2 adapter

Electrical Specifications

- Supply voltage/power consumption:
 - EC01: +12V, 1.6A; +12V on pin 1, GND on pin 2

- EM05: +5V (4.85V..5.25V), 2A max.
- EM05: +3.3V (3.2V..3.4V), 2A max.
- MTBF EM05: tbd. @ 50°C

Mechanical Specifications

- Dimensions of EC01 PCB: 170mm x 150mm
- EM05 conforming to ESM specification (PCB: 149mm x 71mm)
- Weight
 - EC01: 200g (without floppy drive)
 - EM05: 110g (w/o heat sink, w/o CompactFlash card); heat sink: 155g

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

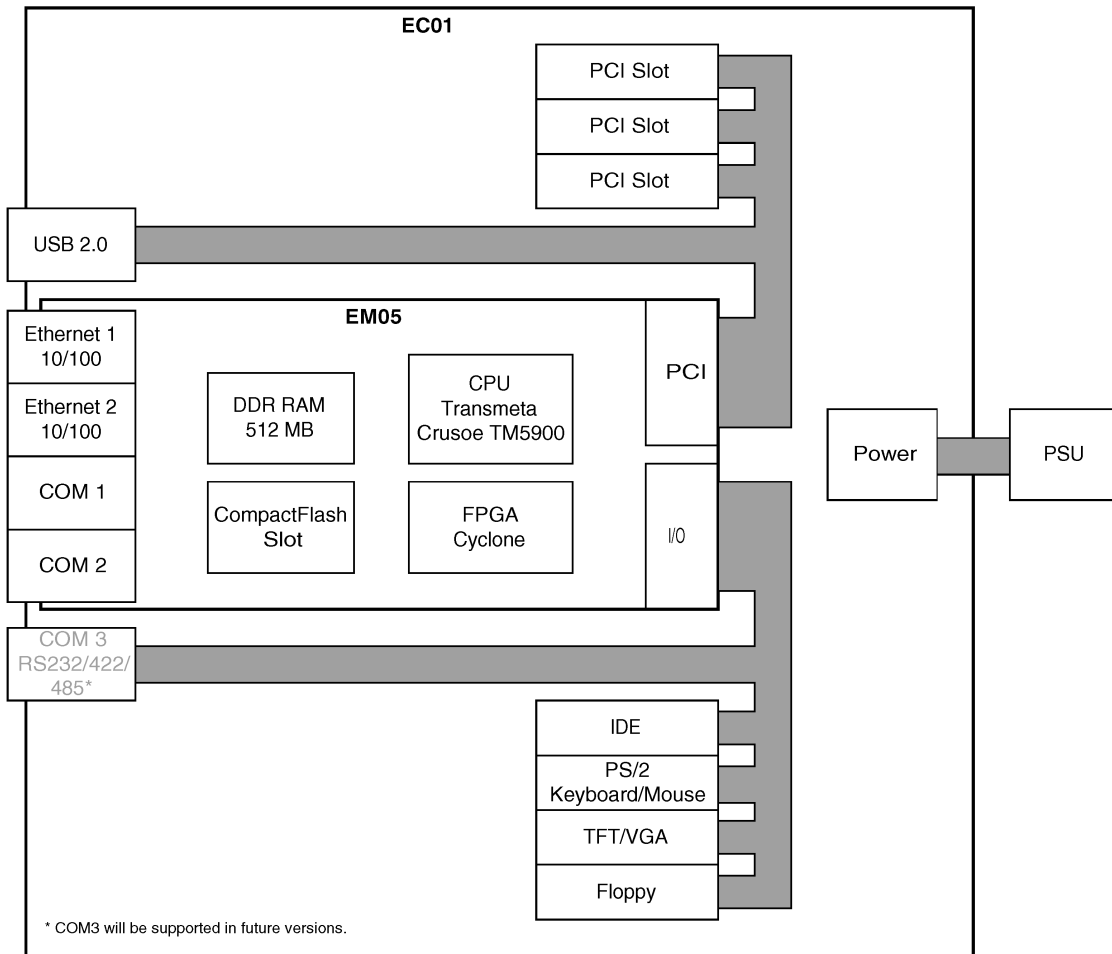
EMC

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

Software Support

- Award BIOS
- Linux
- Windows
- VxWorks (on request)

Diagram



Related Products

Standard Hardware

08EK03-00	ESM evaluation kit: Mini ATX carrier board EC01 with 1 ESM slot, 3 PCI slots, COM2 switchable, TFT/VGA, PS/2, IDE, floppy interfaces; ESM EM05 with Crusoe TM5900 / 800MHz, 2 Fast Ethernet (RJ45), COM 1 (DSUB), FPGA functions (graphics 800x600, TFT, floppy); temperature range: 0..+60°C; incl. VGA cable, RJ45 to D-Sub cable, keyboard/mouse y-cable, external PSU and adapter for mounting of one PCI-104 module - 512MB DRAM installed, CompactFlash not installed (08EK03-00 = EC01-06 + EM05-00 + SA13-01)
15EM05-00	EM05, ESM - Embedded System Module, Transmeta TM5800 / 800MHz, CompactFlash slot, SO-DIMM DRAM slot, dual Fast Ethernet (RJ45), COM 1 (DSUB); standard FPGA contents graphics 800x600, SRAM controller, RTS-controlled UART; 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 of new (customized) IP cores. Depending on the hardware platform, SA adapters can be used to realize the physical lines - see below.

Altera offers free download of its FPGA development software: The Quartus II Web Edition software includes a complete environment for FPGA and CPLD design, including schematic- and text-based design entry, integrated VHDL and Verilog HDL synthesis and support for third-party synthesis software, SOPC Builder system generation software, place-and-route, verification, and programming. For more information and free download of the software please refer to www.altera.com/products. The Altera Tools Selector guide describes the Altera tool offerings and requirements. The online version of the document is available at www.altera.com/literature.

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

Related Products

0752-0105	512MB DDRAM 0..+60°C for 15EM05-00
08SA13-00	Serial interface adapter, PS/2 for keyboard/mouse, -40..+85°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

13EM05-70	MEN Windows® drivers for EM05
13EM05-71	Windows® 2000/XP network driver for F8 and EM05 (ESM kit EK03)
13Z018-06	MDIS4/2004 low-level driver sources for EM05 watchdog

Documentation

20EK03-00	EK03 user manual
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For the most up-to-date ordering information and direct links to other data sheets and downloads, see the EK03 online data sheet under www.men.de. --> [Click here!](#)

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