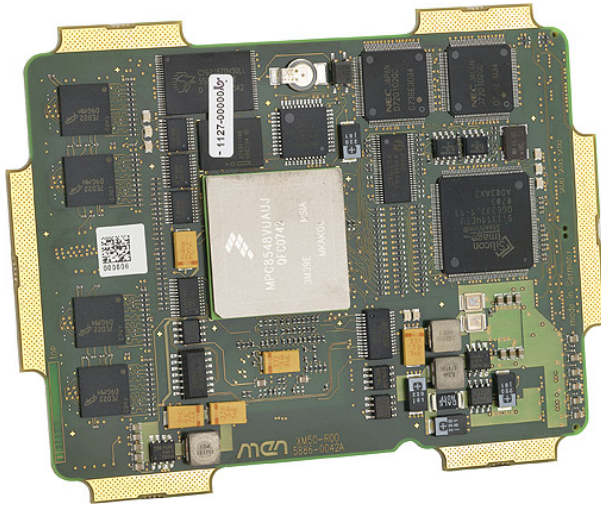


# XM50 - ESMexpress® with PowerPC® MPC8548



- RSE, Rugged System-On-Module Express (ANSI-VITA 59 in process)
- MPC8548 (or MPC8543), up to 1.5 GHz
- Up to 2 GB (ECC) DDR2 SDRAM
- Up to 128 KB FRAM, 2 MB SRAM
- 3 (or 2) Gb Ethernet ports
- 6 USB 2.0, 1 USB client
- 3 SATA ports
- 1 PCI Express® x4
- MENMON™ BIOS for PowerPC® cards
- -40°C to +85°C screened
- Conductive cooling

The XM50 is a Computer-On-Module of the ESMexpress® family in accordance with a proposed ANSI standard currently under development (ANSI-VITA 59, RSE Rugged System-On-Module Express). Together with an application-specific carrier board it forms a semi-custom solution for industrial, harsh, mobile and mission-critical environments.

The XM50 is controlled by an integrated PowerPC® MPC8548 or MPC8543 processor (optionally with encryption unit) running at clock frequencies between 800 MHz and 1.5 GHz.

The XM50 accommodates up to 2 GB of directly soldered ECC main memory and supports other memory like USB Flash on the carrier board. It also features industrial FRAM and SRAM.

Interfaces from the MPC8548 are all routed from the XM50 for availability on any ESMexpress® carrier board. Those interfaces include up to three Gigabit Ethernet channels, 8 PCI Express® lanes for one link (x4, x2 or x1, or x8 as an option), triple SATA, 6 USB host ports and one USB client realized using a UART-to-USB converter. Additional COM interfaces can be made available on the carrier board via USB to COM conversion.

The XM50 comes with MENMON™ support. This firmware/BIOS can be used for bootstrapping operating systems (from disk, Flash or network), for hardware testing, or for debugging applications without running any operating system.

The XM50 is screened for operation in a -40°C to +85°C conduction or convection cooled environment. As all ESMexpress® modules it is embedded in a covered frame. This ensures EMC protection and allows efficient conductive cooling. Air cooling is also possible by applying a heat sink on top of the cover. Where operation temperatures are moderate, the module may even do without the frame and cover, with a suitable low-power processor and airflow. ESMexpress® modules are firmly screwed to a carrier board and come with rugged industry-proven connectors supporting high frequency and differential signals. Only soldered components are used to withstand shock and vibration, and the design is optimized for conformal coating. All ESMexpress® modules support a single 95x125mm form factor.

For evaluation and development purposes an ATX carrier board is available. The ESMexpress® module can be evaluated on a COM Express™ carrier board via an adapter from ESMexpress® to COM Express™.

## Technical Data

### CPU

- PowerPC® PowerQUICC™ III MPC8548, MPC8548E, MPC8543 or MPC8543E
  - 800MHz up to 1.5GHz
  - Please see Configuration & Options for available standard versions.
  - e500 PowerPC® core with MMU and double-precision embedded scalar and vector floating-point APU
  - Integrated Northbridge and Southbridge

### Memory

- 2x32KB L1 data and instruction cache, 512KB/256KB L2 cache integrated in MPC8548/MPC8543
- Up to 2GB SDRAM system memory
  - Soldered
  - DDR2 with or without ECC
  - Up to 300 MHz memory bus frequency, depending on CPU
- 16MB boot Flash
- 2MB non-volatile SRAM
  - With GoldCap or battery backup on the carrier board
- 128KB non-volatile FRAM
- Serial EEPROM 8kbits for factory settings

### Serial IDE (SATA)

- Three ports via ESMexpress® connector
- Transfer rates up to 150MB/s (1.5 Gbits/s)
- Via PCI-to-SATA bridge

### USB

- Six USB 2.0 host ports via ESMexpress® connector
  - OHCI and EHCI implementation
  - Data rates up to 480Mbits/s
- One USB client port via ESMexpress® connector
  - Via UART-to-USB converter
  - Data rates up to 115.2kbits/s
  - 16-byte transmit/receive buffer
  - Handshake lines: none

### Ethernet

- Three 10/100/1000Base-T Ethernet channels with MPC8548/E
- Two 10/100/1000Base-T Ethernet channels with MPC8543/E
- Accessible via ESMexpress® connector
- Two LED signals per channel for LAN link, activity status and connection speed

### PCI Express®

- One x1 or one x2 or one x4 link via ESMexpress® connector
- Data rate 250MB/s in each direction (2.5 Gbits/s per lane)

### GPIO

- 1 line from board controller via ESMexpress® connector
- Usable for LED

### Miscellaneous

- Real-time clock (with GoldCap or battery backup on the carrier board)
- Temperature sensor, power supervision and watchdog

### ESMexpress® Specifications

- In accordance with proposed standard ANSI-VITA 59 RSE Rugged System on Module Express

### Electrical Specifications

- Supply voltage/power consumption:
  - +12V (9..16V), 12W approx.

### Mechanical Specifications

- Dimensions: 95mm x 125mm (conforming to ESMexpress® specification)
- ESMexpress® PCB mounted between a frame and a cover
- Weight: 250g (incl. cover and frame)

### Environmental Specifications

- Temperature range (operation):
  - -40..+85°C Tcase (screened)
- 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): 1g/10..150Hz
- Conformal coating on request

### MTBF

- tbd. @ 40°C according to IEC/TR 62380 (RDF 2000)

### Safety

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

### EMC

- Conforming to EN 55022 (radio disturbance), IEC1000-4-2 (ESD) and IEC1000-4-4 (burst)

### BIOS

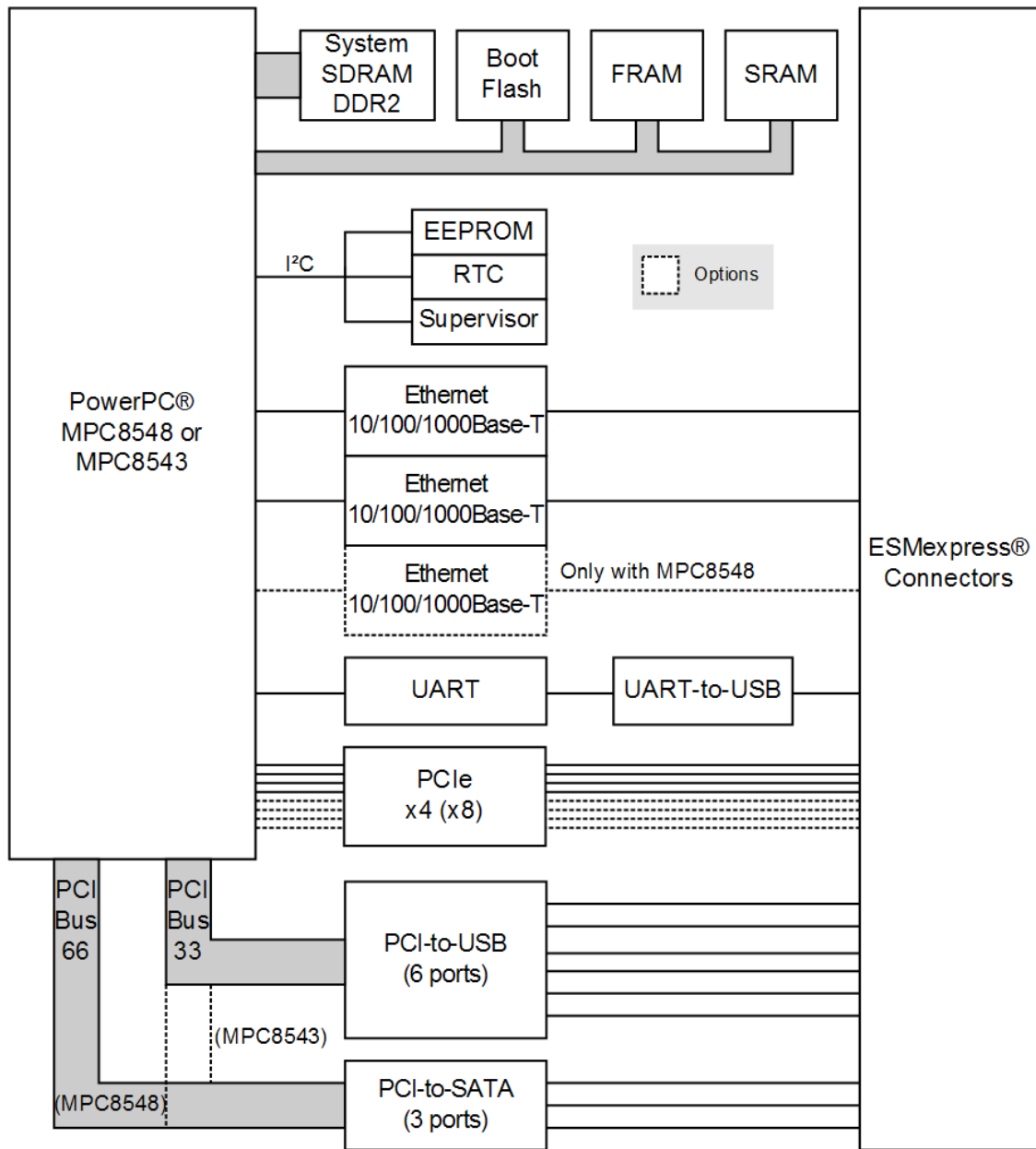
- MENMON™

## Technical Data

### Software Support

- Linux (ELinOS tbd.)
- VxWorks®
- QNX® (in preparation; support of the FPU is currently not provided by QNX®)
- OS-9® (on request)
- For more information on supported operating system versions and drivers see Software.

**Diagram**



## Configuration & Options

### Standard Configurations

Article No.	CPU Type	Clock	System RAM	SRAM	FRAM	Operation Temperature
15XM50-00	MPC8548	1.33 GHz	512 MB ECC	2 MB	128 KB	-40..+85°C

### Options

#### CPU

- Several PowerQUICC™ III types with different clock frequencies
  - MPC8548 or MPC8548E
    - 1 GHz, 1.2 GHz, 1.33 GHz or 1.5 GHz
  - MPC8543 or MPC8543E
    - 800 MHz or 1 GHz

#### Memory

- System RAM
  - 512 MB, 1 GB or 2 GB
  - With or without ECC
- SRAM
  - 0 MB or 2 MB
- FRAM
  - 0 KB or 128 KB

#### I/O

- Ethernet
  - Only two channels instead of three with MPC8543
- PCI Express® links: one x8 link
  - Reduces operation temperature range because of higher DDR SDRAM clock

**Please note that some of these options may only be available for large volumes. Please ask our sales staff for more information.**

## Ordering Information

### Standard Hardware

**15XM50-00** MPC8548, 1.33 GHz, 512 MB DDR2 RAM, 2 MB SRAM, 128 KB FRAM, -40..+85°C screened

### Related Hardware

**08AE12-00** ESMexpress® module to COM Express carrier adapter, 0..+60°C

**08XC01-00** Evaluation and development board for all ESMexpress® modules (coming with top cover and frame), incl. faceplate, 4GB USB Flash Disk and USB cable type A to A

### Miscellaneous

**0712-0019** Standard ATX PSU, 350W, 0..+40°C

**08AE12-00** ESMexpress® module to COM Express carrier adapter, 0..+60°C

**08XC01-00** Evaluation and development board for all ESMexpress® modules (coming with top cover and frame), incl. faceplate, 4GB USB Flash Disk and USB cable type A to A

### Software: VxWorks

**10EM09-60** VxWorks® BSP (MEN) for EM9, EK9, A17 and XM50

### Software: Firmware/BIOS

**14XM50-00** MENMON™ (Firmware) for XM50 (object code)

### Documentation

**20XM50-00** XM50 User Manual

**20XM50-ER** XM50 Errata

**For the most up-to-date ordering information and direct links to other data sheets and downloads, see the XM50 online data sheet under » [www.men.de](http://www.men.de).**

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