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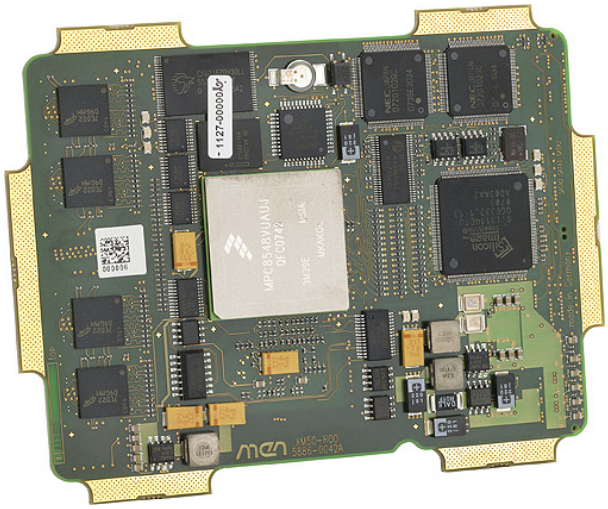
XM50 - ESMexpress® COM with PowerPC® MPC8548



- **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 Tcase screened**
- **Conduction cooling**
- **ANSI/VITA 59 in process**

The XM50 is a computer-on-module of the ESMexpress® family controlled by an integrated PowerPC® MPC8548 or MPC8543 CPU processor (optionally with encryption unit) with clock frequencies between 800 MHz and 1.5 GHz. The card complies with the proposed ANSI/VITA 59 standard currently under development. Together with an application-specific carrier board it forms a semi-custom solution for industrial, harsh, mobile and mission-critical environments.
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 operating 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™.

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Technical Data

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

Memory
- 2x 32 KB L1 data and instruction cache, 512 KB / 256 KB L2 cache integrated in MPC8548/MPC8543
- Up to 2 GB SDRAM system memory
  - Soldered
  - DDR2 with or without ECC
  - Up to 300 MHz memory bus frequency, depending on CPU
- 16 MB boot Flash
- 2 MB non-volatile SRAM
  - With GoldCap or battery backup on the carrier board
- 128 KB non-volatile FRAM
- Serial EEPROM 8 kbits for factory settings

Serial ATA (SATA)
- Three ports via ESMexpress® connector
- SATA Revision 1.x support
- Transfer rates up to 150 MB/s (1.5 Gbit/s)
- Via PCI-to-SATA bridge

USB
- Six USB 2.0 host ports via ESMexpress® connector
  - OHCI and EHCI implementation
  - Data rates up to 480 Mbit/s
- One USB client port via ESMexpress® connector
  - Via UART-to-USB converter
  - Data rates up to 115.2 kbit/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
- Two LED signals per channel for LAN link and activity status and connection speed
- Accessible via ESMexpress® connector

PCI Express®
- One x1 or one x2 or one x4 link via ESMexpress® connector
- PCIe® 1.x support
- Data rate 250 MB/s in each direction (2.5 Gbit/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..16 V), 12 W approx.

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

Environmental Specifications
- Temperature range (operation): -40..+85°C Tcase (ESMexpress® cover/frame) (screened)
- Temperature range (storage): -40..+85°C
- Relative humidity (operation): max. 95% non-condensing
- Relative humidity (storage): max. 95% non-condensing
- Altitude: -300 m to +3,000 m
- Shock: 15 g, 11 ms (EN 60068-2-27)
- Bump: 10 g, 16 ms (EN 60068-2-29)
- Vibration (sinusoidal): 1 g, 10 Hz - 150 Hz (EN 60068-2-6)
- Conformal coating on request

MTBF
- 209,732h @ 40°C according to IEC/TR 62380 (RDF 2000)

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

EMC
- EMC behavior depends on the system and housing surrounding the ESMexpress® module. MEN has performed general, successful EMC tests for ESMexpress® using the XC1 evaluation carrier according to EN 55022 (radio disturbance), IEC 61000-4-2 (ESD), IEC 61000-4-3 (electromagnetic field immunity), IEC 61000-4-4 (burst), IEC 61000-4-5 (surge) and IEC 61000-4-6 (conducted disturbances)

Technical Data

BIOS
- MENMON™

Software Support
- Linux
- VxWorks®
- QNX® (on request; support of the FPU is currently not provided by QNX®)
- INTEGRITY® (Green Hills® Software) support available. Please contact Green Hills® for further information.
- OS-9® (on request)
- For more information on supported operating system versions and drivers see Software.

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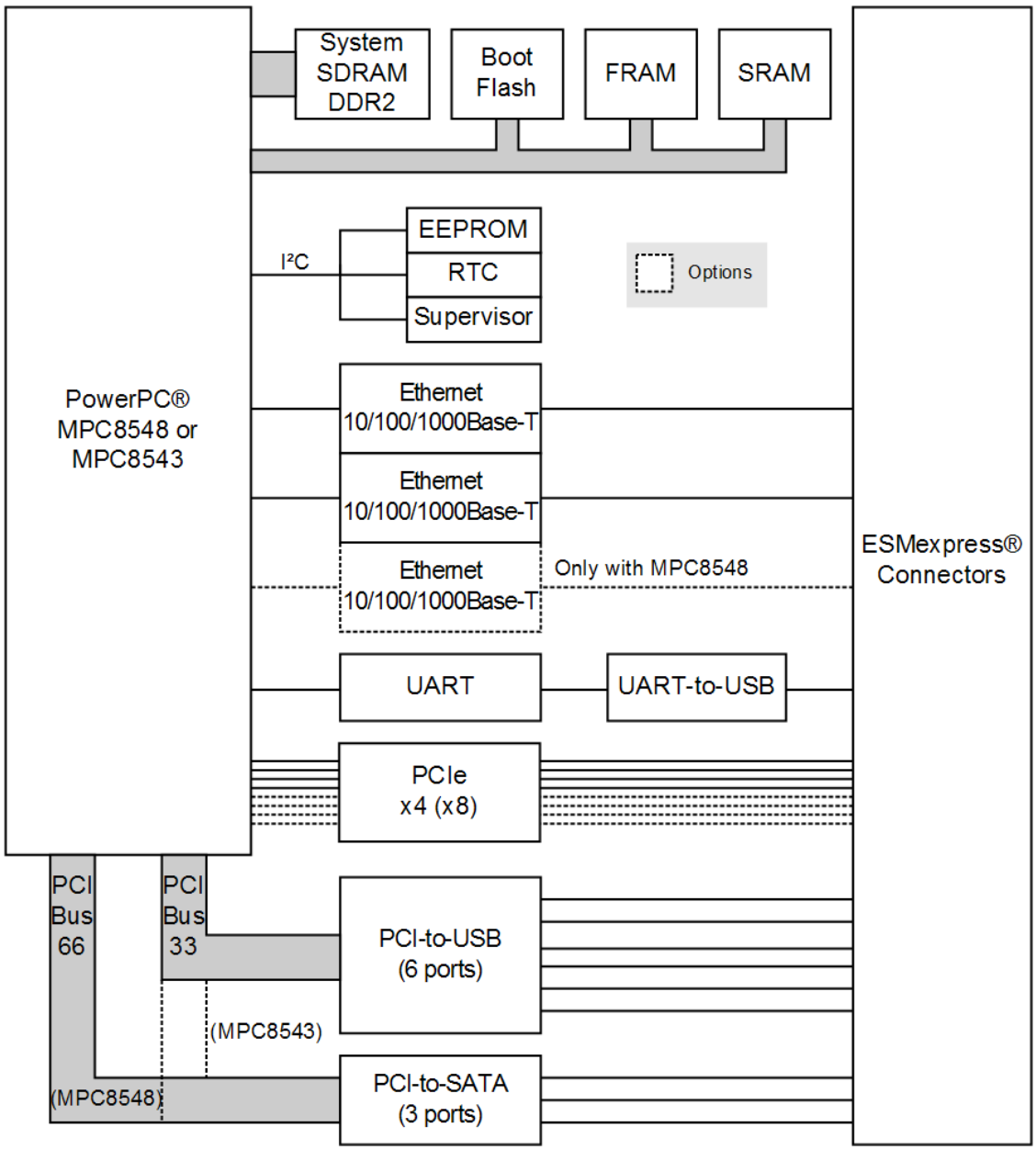
Diagram



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Configuration & Options

Standard Configurations

Article No.	CPU Type	Clock	System RAM	SRAM	FRAM	Operating 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

Software Support

- QNX® (on request; support of the FPU is currently not provided by QNX®)
- OS-9® (on request)

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

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Ordering Information

Standard XM50 Models

15XM50-00 MPC8548 / 1.33 GHz, 512 MB DDR2 DRAM, 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), 0..+60°C, incl. faceplate, 4 GB USB Flash Disk and USB cable type A to A

Miscellaneous Accessories

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

Software: Linux

This product is designed to work under Linux. See below for potentially available separate software packages from MEN.

10EM09-91 General Linux BSP for A17, EM9, EM9A, EK9, F50C, F50P and XM50

Software: VxWorks

This product is designed to work under VxWorks®. For details regarding supported/unsupported board functions please refer to the corresponding software data sheets.

10EM09-60 VxWorks® BSP (MEN) for A17, EK9, EM9, EM9A, F50C, F50P and XM50

Software: INTEGRITY

This product is designed to work under the INTEGRITY® RTOS from Green Hills® Software. An INTEGRITY® Board Support Package for this board is provided by Green Hills® Software. For more information and product support please contact Green Hills® Software (www.ghs.com).

Software: Firmware/BIOS

MENMON™ is MEN's firmware/BIOS for PowerPC® platforms.

14XM50-00 MENMON™ (Firmware) for XM50, F50C and F50P (object code)

Software: Miscellaneous

A Windows® USB2UART driver from FTDI is available for XM50, XM51 and F50P/F50C Windows® hosts. More info & downloads

For operating systems not mentioned here contact MEN sales.

Documentation

Compare Chart ESMexpress® Embedded System ModulesDownload

You can find general literature on MEN computer-on-modules, including presentations about ESMexpress®, ESMini™ and their cooling concept, in our Download Library.

20XM50-ER XM50 Errata

20XM50-00 XM50 User Manual

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.

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