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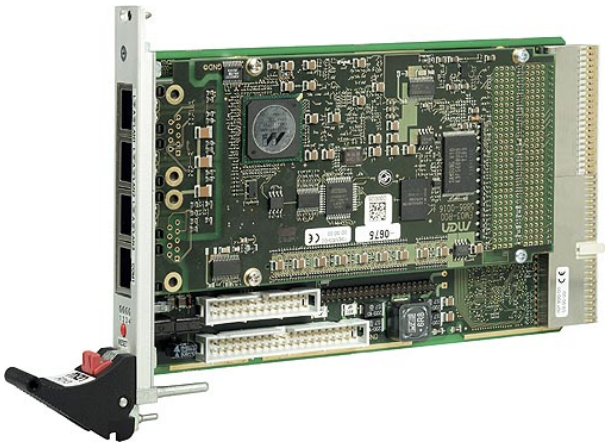
F13 - 3U CompactPCI® MPC8540 SBC



- **32-bit/33-MHz cPCI system slot, 4 HP**
- **MPC8540, 800 MHz (PowerQUICC™ III)**
- **FPGA 12,000 LEs (approx.144,000 gates)**
- **Up to 2 GB DDR DRAM (SO-DIMM)**
- **NAND Flash**
- **2 Gigabit / 1 Fast Ethernet (RJ45 on front)**
- **1 COM (RJ45 on front)**
- **FPGA for user-defined I/O functions**
- **MENMON™ BIOS for PowerPC® cards**

Equipped with the MPC8540 PowerQUICC™ III PowerPC®, the 3U single-board computer F13 is a versatile 3U Eurocard CompactPCI® board that operates at up to 800 MHz. The F13 is designed especially for systems which require multiple and fast communication channels and is thus well placed as a rugged computing platform for high-end industrial communication applications like robot control. It offers the whole world of Linux based software and real-time operating system support for VxWorks® and QNX®.

The F13 is equipped with an on-board 133 MHz fast DDR RAM on an SO-DIMM socket for data and with NAND Flash for program storage. The SBC provides front panel access for two Gigabit Ethernet, one fast Ethernet and one COM via four RJ45 connectors. A second serial interface can be accessed using an SA-Adapter™ on the F13. (E)IDE and GPIO are also on board.

The FPGA on the F13 allows to realize additional user-defined functions such as graphics, touch, further serial interfaces, CAN bus controllers, binary I/O etc. for the needs of the individual application in a very flexible way. Before boot-up of the system, the FPGA is loaded from the boot Flash. Updates of the FPGA contents can be made inside the boot Flash during operation. The FPGA functions can be physically implemented by using SA-Adapters™. A maximum of 6 SA-Adapters™ can be used on the F13 and the I/O can be made accessible at the front panel.

Equipped with a PCI-bridge chip, the F13 offers a full CompactPCI® interface (system slot functionality) for reliable system expansion.
The F13 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.

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Technical Data

CPU
- PowerPC®
  - MPC8540 PowerQUICC™ III
  - 800MHz (666..833MHz optional)
  - e500 PowerPC® core with SPE APU and MMU
  - Integrated Northbridge and Southbridge
  - High memory bandwidth

Memory
- 2x32KB L1 data and instruction cache, 256KB L2 cache / SRAM integrated in MPC8540
- Up to 2GB SDRAM system memory
  - One SO-DIMM slot for SDRAM modules
  - DDR2100 with or without ECC
  - 133MHz memory bus frequency
- Up to 1GB soldered NAND Flash (and more), FPGA-controlled
- Up to 16MB additional SDRAM, FPGA-controlled, e.g. for video data and NAND Flash firmware
- 8MB boot Flash
- 32KB non-volatile FRAM
- Serial EEPROM 4kbits for factory settings

Mass Storage
- Parallel IDE (PATA)
  - One IDE port via 44-pin onboard connector
  - FPGA-controlled
  - PIO mode 0 support
- Up to 1GB soldered ATA NAND Flash (and more), FPGA-controlled

I/O
- Three Ethernet channels
  - Two 10/100/1000Base-T Ethernet channels
  - One 10/100Base-T Ethernet channel
  - Three RJ45 connectors at front panel
  - Two onboard LEDs to signal LAN Link and Activity
- One RS232 UART (COM1)
  - One RJ45 connector at front panel
  - Data rates up to 115.2kbits/s
  - 16-byte transmit/receive buffer
  - Handshake lines: CTS, RTS
- One UART (COM10)
  - FPGA-controlled
  - Accessible via I/O connector
  - Physical interface at front panel using SA-Adapter™ via 10-pin ribbon cable on I/O connector
  - RS232..RS485, isolated or not: for free use in system (e. g. cable to front)
  - Data rates up to 115.2kbits/s
  - 16-byte transmit/receive buffer
  - Handshake lines: CTS, RTS; DCD, DSR, DTR; RI
- GPIO
  - 36 GPIO lines
  - FPGA-controlled
  - Connection via onboard I/O connector
- Further I/O depending on FPGA configuration

Front Connections (Standard)
- Three Ethernet (RJ45)
- One RS232 UART (RJ45)

FPGA
- Standard factory FPGA configuration:
  - Main bus interface
  - 16Z070_IDEDISK - IDE controller for NAND Flash
  - 16Z043_SDRAM - Additional SDRAM controller (16MB)
  - 16Z023_IDENHS - IDE controller (PIO mode 0; non-hot-swap)
  - 16Z025_UART - UART controller (controls COM10)
  - 16Z034_GPIO - GPIO controller (40 lines, 5 IP cores)
- The FPGA offers the possibility to add customized I/O functionality. See FPGA.

Miscellaneous
- Real-time clock with GoldCap backup
- Power supervision and watchdog
- Reset button, GPIO-controlled
- Three user LEDs, GPIO-controlled; 1 FPGA power status LED

CompactPCI® Bus
- Compliance with CompactPCI® Core Specification PICMG 2.0 R3.0
- System slot
- 32-bit/33-MHz PCI-to-PCI bridge
- V(I/O): +3.3V (+5V tolerant)

Electrical Specifications
- Supply voltage/power consumption:
  - +5V (-3%/+5%), 2.5A typ.
  - +3.3V (-3%/+5%), 0.5A typ.
- MTBF: 134,000h @ 40°C (derived from MIL-HDBK-217F)

Mechanical Specifications
- Dimensions: conforming to CompactPCI® specification for 3U boards
- Weight: 358g

Environmental Specifications
- Temperature range (operation):
  - 0..+60°C
  - 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

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Technical Data

- Shock: 15g/11ms
- Bump: 10g/16ms
- Vibration (sinusoidal): 2g/10..150Hz
- Conformal coating on request

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)

BIOS

- MENMON™

Software Support

- VxWorks®
- Linux (ELinOS)
- QNX®
- For more information on supported operating system versions and drivers see Software.

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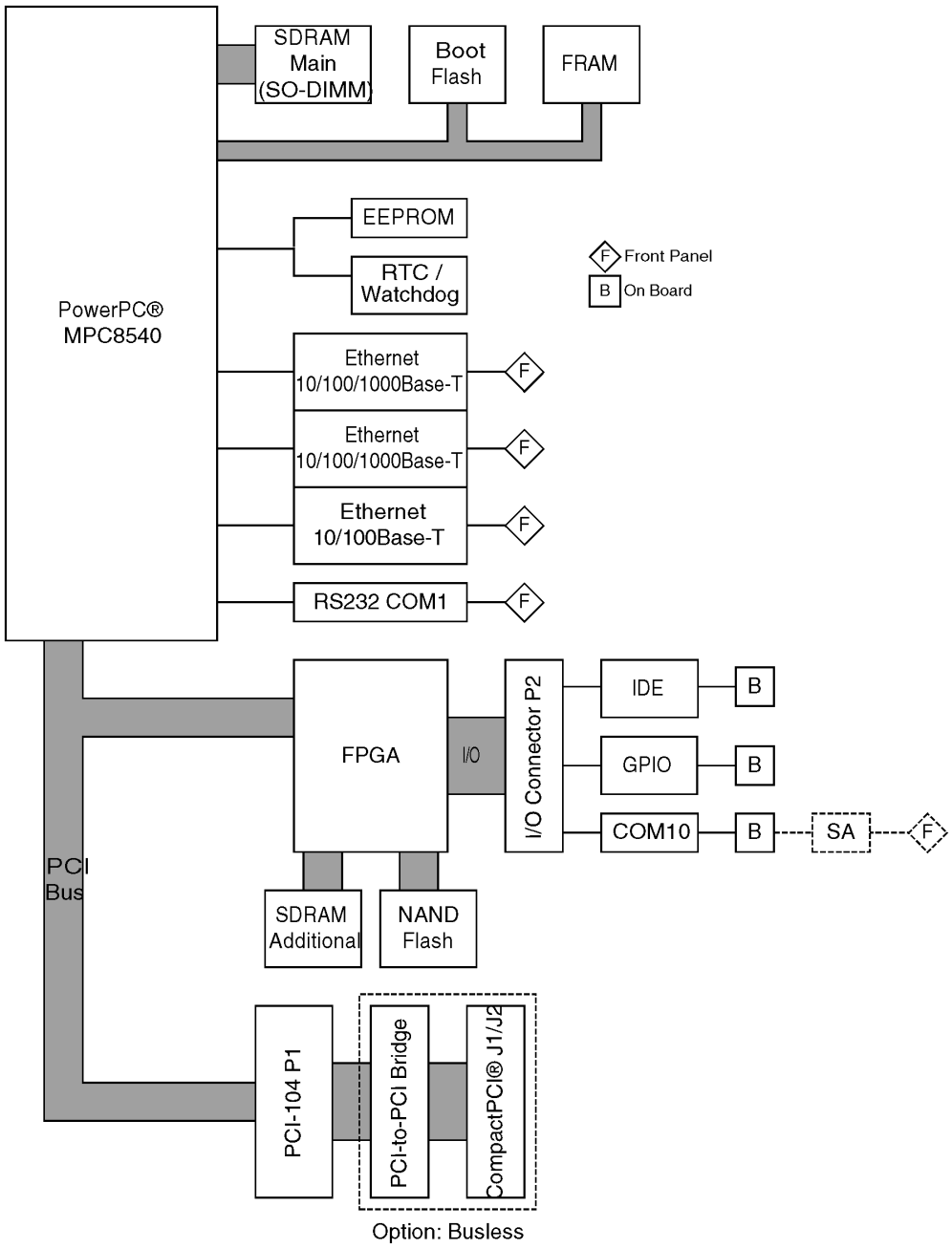
Diagram



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Configuration & Options

Standard Configurations

Article No.	CPU Type	Clock	System RAM	NAND Flash	Additional SDRAM	FRAM	Boot Flash	Operation Temperature
02F013-00	MPC8540	800 MHz	512 MB (no ECC)	128 MB	16 MB	32 KB	8 MB	0..+60°C

Options

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

CPU

- Type
  - MPC8540
  - MPC8560
- Clock
  - 666..833 MHz

Memory

- System RAM
  - 256 MB, 512 MB, 1 GB or 2 GB
  - With or without ECC
- NAND Flash
  - 0 MB up to maximum available
- Additional SDRAM
  - 0 MB or 16 MB
- FRAM
  - 0 MB or 32 MB
- Boot Flash
  - 8 MB or 16 MB

I/O

- Up to 6 additional serial I/O functions through SA-Adapters™
  - Controlled by onboard FPGA
  - RS232, RS422/485, binary I/O, keyboard/mouse, AC'97 audio, CAN...
  - One-piece 3U front panels for different SA-Adapter™ combinations
- Front Connections
  - D-Sub connectors for Ethernet and COM
  - LAN1 and LAN2 via one 9-pin D-Sub connector with 10/100Base-T support
  - LAN3 and COM1 via one 9-pin D-Sub connector (LAN3 always with 10/100Base-T)

Busless

- Also available as busless version (with external 5V supply)

Operation Temperature

- 0..+60°C

FPGA

Flexible Configuration

- This MEN board offers the possibility to add customized I/O functionality in FPGA.
- It depends on the board type, pin counts and number of logic elements which IP cores make sense and/or can be implemented. Please contact MEN for information on feasibility.
- You can find more information on our web page "User I/O in FPGA"

FPGA Capabilities

- FPGA Altera® Cyclone® EP1C12
  - 12,060 logic elements
  - 239,616 total RAM bits
- Connection
  - Available pin count: 47 pins
  - Functions available via onboard I/O connector
  - SA-Adapters™ can be used to realize the physical lines.

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Ordering Information

Standard Hardware

02F013-00	MPC8540/800MHz, 512MB DRAM, 128MB NAND Flash, 16MB additional SDRAM, 32KB FRAM, 0..+60°C

SA-Adapters

05F500-01	Kit (cables and front panel for 2 D-Subs) for connection of 1 COM (type SA1..SA4) and 8 GPIO signals to F13 - SA-Adapter to be ordered separately
08SA01-00	RS232, not optically isolated, 0..+60°C
08SA02-00	RS422/485, half duplex, optically isolated, 0..+60°C
08SA02-01	RS422/485, full duplex, optically isolated, 0..+60°C
08SA02-07	RS422/485, full duplex, optically isolated, -40..+85°C screened
08SA03-00	RS232, optically isolated, 0..+60°C
08SA03-01	RS232, optically isolated, -40..+85°C screened

Systems & Card Cages

0701-0056	CompactPCI 19" 4U/84HP rack-mount enclosure for 3U cards (vertical), 4+4-slot 3U CompactPCI / cPCI Serial hybrid backplane, prepared for rear I/O, 250W power supply wide range 90..264VAC on rear, 1U fan tray with 2 fans included, 0..+60°C

Miscellaneous

05F006-00	RS232 interface cable RJ45 to 9-pin D-Sub (1 COM to 1 COM), 2m

Software: OS independent

13Z017-06	MDIS5 low-level driver sources (MEN) for 16Z034_GPIO and 16Z037_GPIO

Software: Linux

13Z025-90	Linux native driver (MEN) for 16Z025_UART, 16Z057_UART and 16Z125_UART

Software: VxWorks

10EM03-60	VxWorks BSP (MEN) for EM3, EM3A, EM8, EM8A, EK7, A14C and F13
13Z025-60	VxWorks native driver (MEN) for 16Z025_UART, 16Z057_UART and 16Z125_UART

Software: QNX

10EM03-40	QNX BSP (MEN) for EM3, EM3A, EM8, EM8A, EK7, A14C and F13
13Z025-40	QNX native driver (MEN) for 16Z025_UART and 16Z125_UART

Software: Firmware/BIOS

14EM03-00	MENMON (Firmware) for EM3, EM3A, EM8, EM8A, A14C and F13 (object code)

Documentation

20F013-00	F13 User Manual
20F013-ER	F13 Errata
21APPN009	Application Note: 16Z025_UART and 16Z125_UART under Linux
21MENM-00	MENMON 2nd Edition User Manual
22Z025-ER	16Z025_UART Errata

For the most up-to-date ordering information and direct links to other data sheets and downloads, see the F13 online data sheet under » www.men.de.

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Contact Information

Germany
MEN Mikro Elektronik GmbH
Neuwieder Straße 5-7
90411 Nuremberg
Phone +49-911-99 33 5-0
Fax +49-911-99 33 5-901
E-mail info@men.de
www.men.de

France
MEN Mikro Elektronik SA
18, rue René Cassin
ZA de la Châtelaine
74240 Gaillard
Phone +33 (0) 450-955-312
Fax +33 (0) 450-955-211
E-mail info@men-france.fr
www.men-france.fr

USA
MEN Micro, Inc.
24 North Main Street
Ambler, PA 19002
Phone (215) 542-9575
Fax (215) 542-9577
E-mail sales@menmicro.com
www.menmicro.com

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