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# F8 - 3U CompactPCI Infotainment SBC

- **32-bit cPCI system slot or stand-alone, 12 HP**
- **Transmeta Crusoe TM5900 / 800 MHz**
- **512 MB DDR RAM (SO-DIMM) installed**
- **CompactFlash slot**
- **2.5" hard disk slot**
- **Dual Fast Ethernet, COM 1, USB1.1 (front)**
- **DVI and DVI-I (front)**
- **LCD (up to UXGA) and CRT**
- **16 MB integrated graphics RAM**
- **Up to 1600 x 1200 pixels**
- **AC'97 (opt. isolation), keyboard/mouse, CAN, COMs... optional via FPGA with SA adapters**
- **Option: up to 8 SA adapters**

The F8 is a powerful CompactPCI or busless industrial PC for multimedia and infotainment applications -- for vehicles (railways, buses, planes, trucks...) and stationary information systems. It is designed to operate in harsh environments up to EN 50155 (railway standard).

The F8 is controlled by the Crusoe TM5900 microprocessor from Transmeta, a Pentium® III-like x86 CPU with an integrated Northbridge that operates at 800MHz. What makes this CPU especially attractive is its extremely low power consumption of typically 5W at 800MHz and a guaranteed long-term availability of five years.
The SBC is equipped with an onboard 133MHz fast DDR RAM SO-DIMM socket for data storage, a CompactFlash slot for scalable program storage and an integrated graphics RAM.

At its front panel the F8 provides one RS232 interface and two Fast Ethernet channels via RJ45 connectors or 9-pin D-Sub connectors. The front panel also includes two Digital Video Interfaces (DVI and DVI-I) for long-distance connectivity and USB 1.1.
The onboard display controller supports enhanced multi-display capabilities at a maximum of 1600 x 1200 pixels resolution (235-MHz, 24-bit RAMDAC). It can drive two independent digital displays (dual digital), alternatively with identical or with different screen displays. Simultaneously, it can drive two DVI and one CRT display (DualMon).
The F8 provides slots for eight SA adapters for all kinds of serial interfaces (RS232, RS422/485, HDLC, binary I/O, CAN, AC'97 audio, keyboard/mouse). The functionality of the SA adapters (and other individual functions) can be flexibly implemented in the onboard FPGA as a customization of F8. The FPGA content can be programmed by the application software.



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# Technical Data

**CompactPCI Bus**
- 3U CompactPCI CPU board PICMG Spec. 2.0 R3.0 compliant
- 32-bit CompactPCI system slot functionality with 7 possible external loads
- PCI-to-PCI bridge
- Double-slot solution (plus 1 mechanical slot for hard disk)
- V(I/O): +3.3V or +5V (Universal Board)
- Also available as busless version (with external 5V supply)

**CPU**
- Transmeta Crusoe TM5900 Microprocessor with integrated Northbridge
- 800MHz

**Graphics**
- SM731 controller
- DVI and DVI-I connectors at front panel
- 235-MHz, 24-bit RAMDAC
- Maximum resolution: 1600 x 1200 pixels
- DualMon support

**Memory**
- 64KB L1 and 512KB L2 Cache integrated in Crusoe CPU
- Up to 1GB SO-DIMM DDR RAM (512MB installed)
- 133MHz memory bus operation
- 64-bit data bus, 2.5V
- Flash 4MB
- 8-bit data bus, 3.3V
- Hardware data protection
- Serial EEPROM 4kbit for factory settings
- CompactFlash (TM) card interface for Flash ATA (true IDE) via on-board IDE
- Up to 8MB SDRAM, connected to FPGA, e.g. for video data
- 16MB embedded SGRAM in SM731 graphics controller

**Interfaces**
- Two 10/100Mbits/s Ethernet channels
- GD82551ER internal controllers
- Two RJ45 connectors at front panel
- UART RS232 serial interface COM1
- One 9-pin D-Sub connector at front panel
- Up to 230 kbaud
- USB 1.1
- Type A at front panel
- Option: second interface via onboard connector
- Option: Up to 8 SA adapters
- Implemented in onboard FPGA
- RS232, RS422/485, binary I/O, keyboard/mouse, AC'97 audio, CAN...
- Typical configuration (example): 2 CAN (SA08), 2 RS485 (SA02), 1 RS232 (SA03), 1 digital I/O (5 out, 5 in, 3 in/out) (SA15), 1 AC'97 audio with optical isolation (SA12)

**Mass Storage**
- Fast IDE ports
- One IDE port for local CompactFlash
- One IDE hard-disk/CD-ROM port via 44-pin ribbon cable connector Ultra DMA100

**PCI Interface**
- 32-bit PCI interface at PCI-104 connector J1
- Support of 2 external masters

**Electrical Specifications**
- Supply voltage/power consumption:
- +5V (4.85V..5.25V), 2A typ. (w/o SA adapters)
- MTBF: tbd. @ 50°C

**Mechanical Specifications**
- Dimensions: conforming to CompactPCI specification for 3U boards
- Weight: 525 g (without hard disk)

**Environmental Specifications**
- Tested according to EN 50155
- Temperature range (operation):
- -40..+85°C (without hard disk; please regard the manufacturer's specifications for your hard disk regarding temperature)
- Airflow: min. 10m³/h
- Temperature range (storage): -40..+85°C
- Relative humidity (operation): < 75% (95% condensing for 30 days/year)
- Altitude: 1,200m
- Vibration (random): 0.75m/s² (5..150Hz)
- Vibration (shock): 50m/s² (30ms)

**Safety**
- Electric strength: 500V AC (50Hz)
- PCB manufactured with a flammability rating of 94V-0 by UL recognized manufacturers

**EMC**
- Tested according to EN 55022 / 1999-05 (radio disturbance) and EN 55024 / 1999-05 (immunity) with regard to CE conformity

**Software Support**
- Award BIOS
- Linux
- Windows
- VxWorks
- MSCAN/Layer2 support: MEN Driver Interface System (MDIS for Windows, Linux, VxWorks, QNX, RTX, OS-9)

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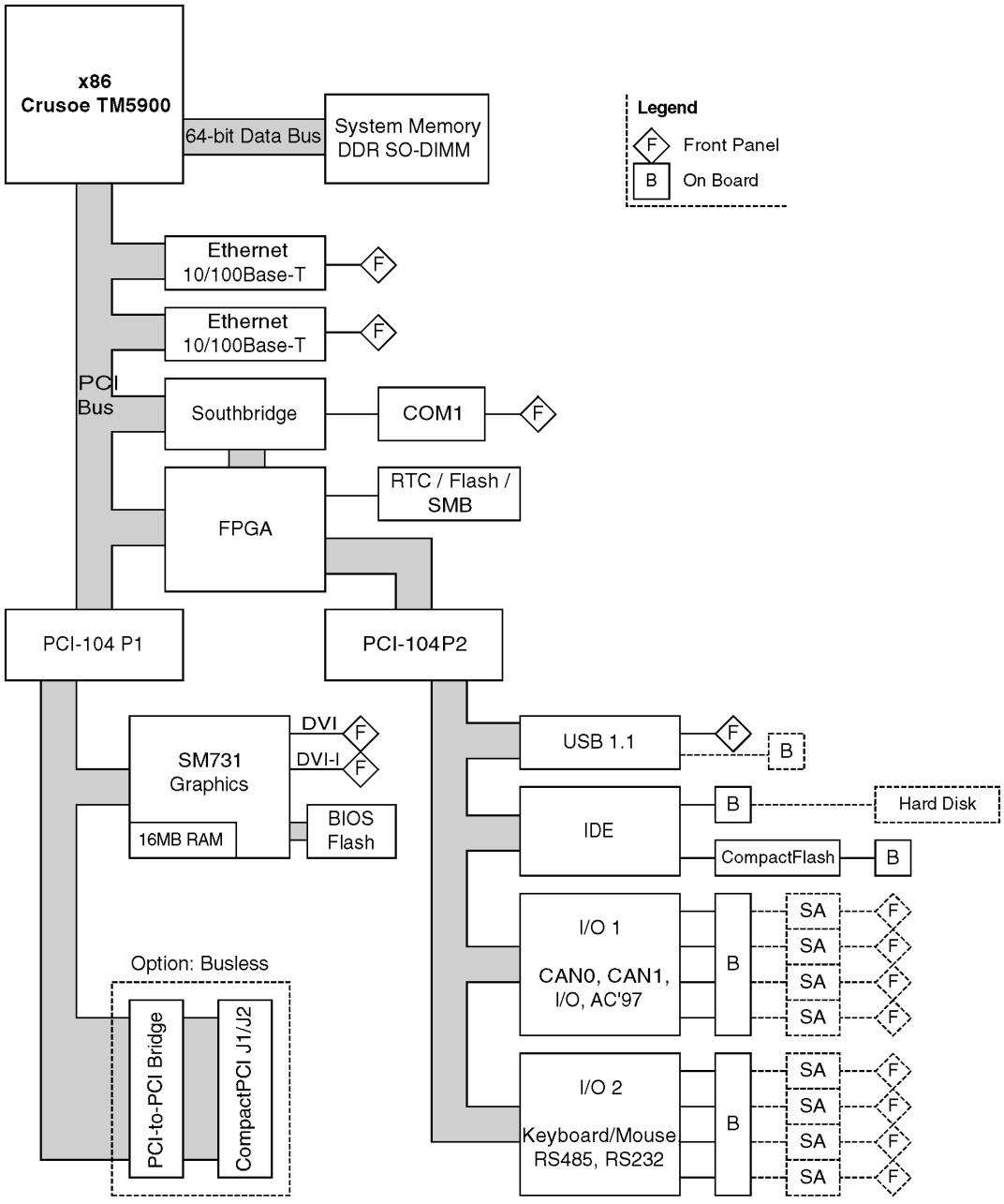
# Diagram



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# Related Products

### Standard Hardware

| | |
|---|---|
| 02F008-00 | F8, 3U 12TE 32-bit CompactPCI system slot infotainment SBC with Transmeta Crusoe TM5900/800MHz, 512MB SDRAM, CompactFlash slot, 2.5" hard disk slot, dual Fast Ethernet (RJ45 front), 1 RS232 (D-Sub front), USB 1.1 (front), CRT/LCD (up to UXGA) graphics controller, DVI and DVI-I (front), 16 MB integrated graphics RAM, up to 1600 x 1200 pixels, standard FPGA contents; quad UART, CAN, 8-bit digital I/O; operating temperature -40..+85°C without hard disk (operating temperature with hard disk according to the corresponding hard disk data sheet) |

Please refer to our 3U CompactPCI 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.

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.

### Systems & Card Cages

Disk drives for basic systems are delivered as requested. Different rack sizes, power supplies and backplanes on request.

| | |
|---|---|
| 0701-0018 | CompactPCI 19" 4U/84HP rack-mount enclosure for 3U cards (vertical), 8-slot 3U CompactPCI backplane, system slot right, no rear I/O, space for hard-disk drive, floppy drive, 300W ATX power supply wide range 100..240VAC on front, 1U fan tray included |
| 0701-0021 | CompactPCI 19" 4U/84HP rack-mount enclosure for 3U cards (vertical), 8-slot 3U CompactPCI backplane, system slot right, prepared for rear I/O, space for hard-disk drive, floppy drive, CD-ROM drive, 300W ATX power supply wide range 100..240VAC on front, 1U fan tray with 2 fans included |

### Accessories

# Related Products

| | |
|---|---|
| 05A000-10 | Keyboard/mouse Y-cable 0.1m, 6-pin Mini DIN plug to two 6-pin Mini DIN receptacles |
| 05F006-00 | RS232 interface cable 9-pin D-Sub plug to 8-pin RJ45 plug, 2m |
| 05F007-02 | DVI-to-VGA cable, DVI plug to 15-pin HD-Sub plug, 2m, -40..+85°C |
| 05F008-00 | Ribbon cable kit for connection of 8 SA adapters to F8 (front panel to be ordered separately) |
| 0501-0001 | DVI-I to DVI-D and VGA Y-adapter cable (for example for D4, F7/N, F8, F9, P17) |
| 0502-0001 | 3U front panel kit for 3 SA adapters, with covers for two SA adapter cut-outs (cables to be ordered separately) |
| You can download the data sheet for hard disk 0710-0012 from MEN's website. --> Download | |
| 0710-0009 | IDE hard disk 2.5", 9.5mm, 20GB; for mounting on-board (harddisk mounting kit may be additionally required) |
| 0710-0012 | Industrial IDE hard disk 2,5", 40GB, 24 hours/7 days, 0..+60°C; for on-board mounting (hard disk mounting kit may be required additionally) |
| 0751-0006 | CompactFlash card, 512MB, Type I, 0..+60°C |
| 0751-0007 | CompactFlash card, 512MB, Type I, -40..+85°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 |
| 0751-0013 | Compact Flash card, 64MB, -40..+85°C |
| 0751-0014 | Compact Flash card, 128MB, -40..+85°C |
| 0751-0018 | CompactFlash card, 256MB, Type I, -40..+85°C |
| 0752-0169 | 512MB DDRAM 0..+60°C for 02F008-00 |
| 0752-0170 | 1GB DDRAM 0..+60°C for 02F008-00 |
| 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 |
| 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 |

# Related Products

| | |
|---|---|
| 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 |
| 08SA08-01 | Serial interface adapter, CAN ISO high-speed, optically isolated, -40..+85°C |
| 08SA12-00 | Serial interface adapter, audio codec AC'97, -40..+85°C |
| 08SA13-00 | Serial interface adapter, PS/2 for keyboard/mouse, -40..+85°C |
| 08SA15-00 | Serial interface adapter, 8 digital I/O, -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**

This MEN board is designed to work in a Microsoft® Windows® environment. For additional Windows® driver packages provided or recommended by MEN please refer to the ordering numbers below.

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

This board is an MEN product running Linux. For Linux BSP and driver support provided by MEN please refer to the ordering numbers below.

| | |
|---|---|
| 13EM05-70 | MEN Windows® drivers for EM05 |
| 13EM05-71 | Windows® 2000/XP network driver for F8 and EM05 (ESM kit EK03) |
| 13F008-70 | Windows® 2000/XP graphics drivers for MEN's F8 |

To use MDIS4 low-level drivers, you also need one of the MDIS4 system packages available for Windows®, Linux, VxWorks®, QNX®, RTX or OS-9 (MDIS4 = MEN Driver Interface System).

| | |
|---|---|
| 13Z015-06 | MDIS4/2004 low-level driver sources for MSCAN/Layer2 |
| 13Z018-06 | MDIS4/2004 low-level driver sources for EM05 watchdog |

*For the most up-to-date ordering information and direct links to other data sheets and downloads, see the F8 online data sheet under www.men.de. --> Click here!*

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