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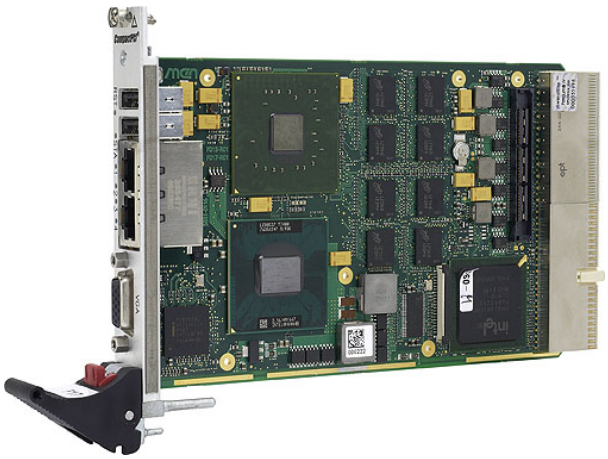
F15 - 3U CompactPCI®/Express Core Duo SBC



- **Intel® Core™ Duo T2500, 2 GHz**
- **PCI Express® six x1 links**
- **4 HP system master or stand-alone**
- **32-bit CompactPCI® or cPCI Express®**
- **Up to 2 GB DDR2 DRAM soldered**
- **CompactFlash® slot**
- **2 SATA interfaces**
- **Video via VGA and 2 SDVO**
- **Up to 3 Gigabit Ethernet (PCIe®)**
- **Up to 8 USB 2.0**
- **High Definition audio**
- **Board controller**

Equipped with an Intel® dual-core high-performance Core Duo processor T2500 running at 2 GHz, the F15 is a versatile 4HP/3U (single-slot, single-size Eurocard) single-board computer, designed especially for embedded systems which require high computing and graphics performance and low power consumption. The F15 comes with a tailored passive heat sink within 4 HP height. Anyhow, forced air cooling is always required inside the system.
The F15 is suited for a wide range of industrial applications, e.g. for monitoring, vision and control systems as well as test and measurement. Main target markets comprise industrial automation, multimedia, traffic and transportation, aerospace, shipbuilding, medical engineering and robotics. The robust design of the F15 make the board especially suited for use in rugged environments with regard to shock and vibration according to applicable DIN, EN or IEC industry standards. The F15 is also ready for coating so that it can be used in humid and dusty environments.
The F15 offers a 32-bit/33-MHz CompactPCI® bus interface and can also be used without a bus system. In combination with a specific side card it can also perform system-slot functionality in a CompactPCI® Express system.
A total of six PCI Express® links for high-speed communication (such as Gigabit Ethernet, graphics) are supported on the F15. 2 x1 PCIe® links are used for the two onboard Ethernet interfaces. 4 x1 or 1 x4 PCIe® links are available on a specific side card.
The DDR2 DRAM (4 GB in preparation) is soldered to F15 to guarantee optimum shock and vibration resistance. A robust IDE CompactFlash® device offers nearly unlimited space for user applications. In addition to parallel ATA, two serial ATA lines are available.
The standard I/O available at the front panel of F15 includes graphics on a VGA connector, two PCIe®-driven Gigabit Ethernet interfaces (additional third Gigabit Ethernet via rear I/O on request)) as well as two USB 2.0 ports.
The F15 can be extended by different side cards to 8 HP. Additional functions realized on these side cards include two digital video outputs for flat panel connection via DVI (multimedia), a variety of different UARTs or another four USB 2.0 ports, SATA for hard disk or RAID connection and High Definition (HD) audio.The F15 is also prepared for rear I/O where for example another two USB 2.0 ports can be connected.
Two watchdogs for thermal supervision of the processor and board temperature as well as for monitoring the operating system complete the functionality of the F15.
The F15 operates in Windows® and Linux environments as well as under real-time operating systems that support Intel®'s multi-core architecture. The Award BIOS was specially designed for embedded system applications.
Equipped with Intel® components exclusively from the Intel® Embedded Line, the F15 has a guaranteed minimum standard availability of 5 years.

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Technical Data

CPU
- Dual-core Intel® Core™ Duo T2500, L2400 (LV), U2500 (ULV) or single-core Celeron® M 440, M 423 (ULV)
  - Up to 2.0GHz processor core frequency
  - Up to 667MHz front-side bus frequency
- Chipset
  - Northbridge: Intel® 945GM Express or Intel® 945GME Express
  - Southbridge: Intel® ICH7-M DH

Memory
- 2MB L2 cache integrated in Core Duo (1MB with Celeron® M)
- Up to 4GB SDRAM system memory
  - Soldered
  - DDR2
  - 667MHz memory bus frequency
  - Dual-channel, 2x64 bits
- 8Mbits boot Flash
- Serial EEPROM 2kbits for factory settings
- CompactFlash® card interface
  - Via onboard IDE
  - Type I
  - True IDE
  - DMA support

Mass Storage
- Parallel IDE (PATA)
  - One IDE port for local CompactFlash®
- Serial ATA (SATA)
  - Two channels via side-card connector
  - Transfer rates up to 150MB/s
  - RAID level 0/1 support

Graphics
- Integrated in 945GM Express chipset
  - 200/250MHz 256-bit graphics core
- VGA connector at front panel
- Two SDVO ports available via side-card connector
  - Two additional DVI connectors at front panel optional via side card
  - Simultaneous connection of two monitors

I/O
- USB
  - Two USB 2.0 ports via Series A connectors at front panel
  - Four USB 2.0 ports via side-card connector
  - Two USB 2.0 ports via rear I/O on request
  - UHCI implementation
  - Data rates up to 480Mbits/s
- Ethernet
  - Up to three 10/100/1000Base-T Ethernet channels
  - Two channels via RJ45 connectors at front panel
  - One additional channel via rear I/O with special adapter on request
  - Ethernet controllers are connected by three x1 PCIe® links
  - Onboard LEDs to signal activity status and connection speed
- High Definition (HD) audio
  - Accessible via side-card connector

Front Connections (Standard)
- VGA
- Two USB 2.0 (Series A)
- Two Ethernet (RJ45)

Miscellaneous
- Board controller
- Real-time clock, buffered by a GoldCap or a battery
- Watchdog timer
- Temperature measurement
- One user LED
- Reset button

PCI Express®
- Two x1 links to connect local 1000Base-T Ethernet controllers
  - Data rate 250MB/s in each direction (2.5 Gbits/s per lane)
- One x4 or four x1 links for extension through side-card connector
  - Data rate up to 1GB/s in each direction (2.5 Gbits/s per lane)

CompactPCI® Bus
- Compliance with CompactPCI® Core Specification PICMG 2.0 R3.0
- CompactPCI® Express support (EXP.0 R1.0)
- System slot
- 32-bit/33-MHz CompactPCI® bus
- V(I/O): +3.3V (+5V tolerant)

Busless Operation
- Board can be supplied with +5V only, all other voltages are generated on the board
- Backplane connectors used only for power supply

Electrical Specifications
- Supply voltage/power consumption:
  - +5V (-3%/+5%), 8.2A
  - +3.3V (-3%/+5%), 1.1A
  - +12V (-10%/+10%), approx. 10mA
  - If the board is supplied with 5V only (typically without a bus connection), the 3.3V are generated on the board and fed to the backplane (3A max.)
- MTBF: 313,831h @ 40°C according to IEC/TR 62380 (RDF2000)

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Technical Data

Mechanical Specifications

- Dimensions: conforming to CompactPCI® specification for 3U boards
- Weight: 382g

Environmental Specifications

- Temperature range (operation):
  - 2GHz Core Duo T2500: 0..+60°C
  - Conditions: airflow 1.5m/s, typical power dissipation 31W, with Windows® XP operating system, 1 Gb Ethernet and hard disk, without CPU clock reduction
- 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
- 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

- Award BIOS

Software Support

- Windows®
- Linux
- VxWorks®
- QNX®
- Intel® Virtualization Technology, allows a platform to run multiple operating systems and applications in independent partitions; one computer system can function as multiple "virtual" systems
- For more information on supported operating system versions and drivers see Software.

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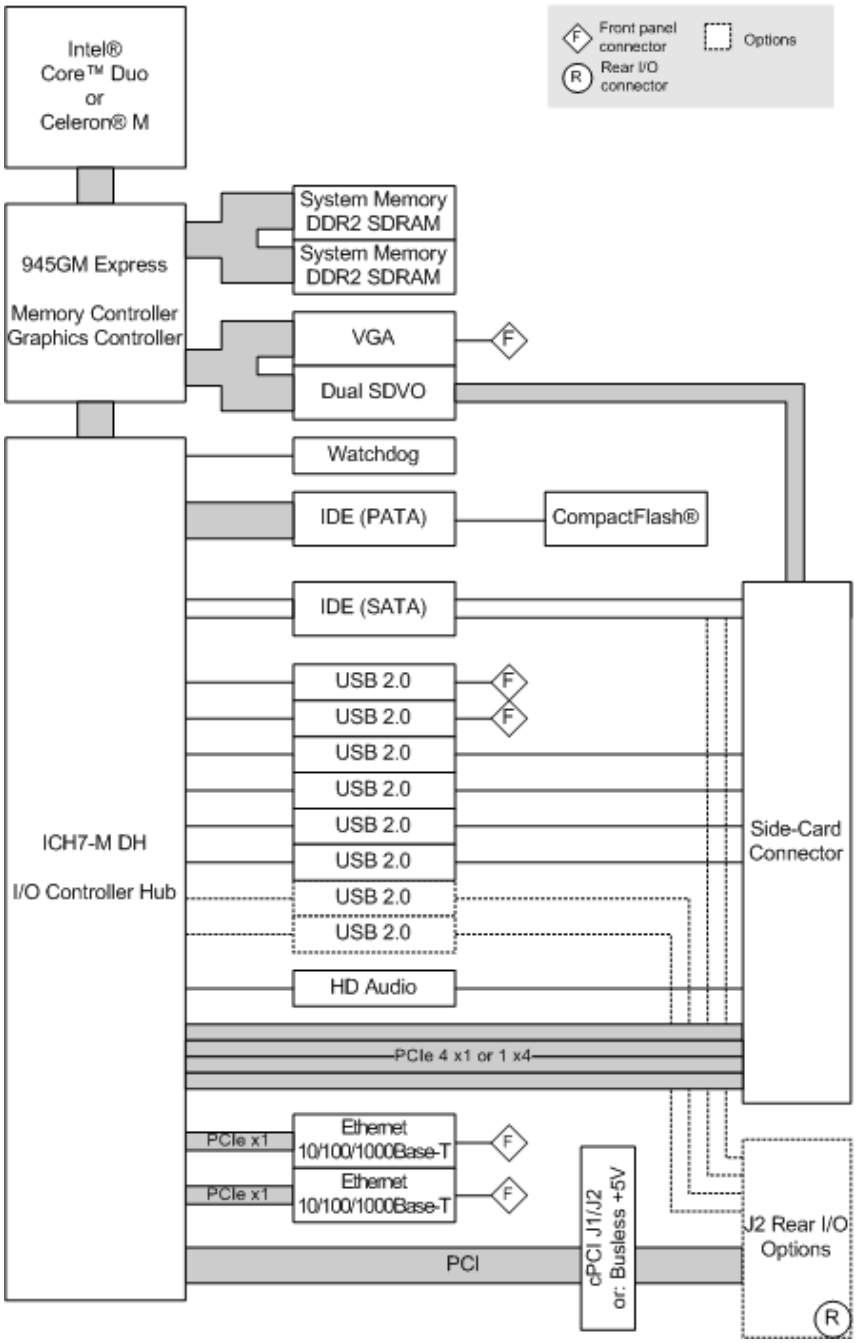
Diagram



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Configuration & Options

Standard Configurations

Article No.	CPU Type	Chipset	Clock	System RAM	CFlash	RTC	Side Card Slot	Operation Temperature
02F015-00	T2500	945GM	2 GHz	1 GB	0 MB	GoldCap	right	0..+45°C
02F015-05	T2500	945GM	2 GHz	1 GB	0 MB	battery	right	0..+45°C
02F015-08	T2500	945GME	2 GHz	1 GB	0 MB	battery	right	0..+60°C

Options

CPU
- Core Duo T2500, 2GHz
- Core Duo L2400, 1.66GHz LV
- Core Duo U2500, 1.2GHz ULV
- Celeron® M 440, 1.86GHz
- Celeron® M 423, 1.07GHz ULV

Memory
- System RAM
  - 256 MB, 512 MB, 1 GB, 2 GB or 4 GB
- CompactFlash®
  - 0 MB up to maximum available

Mass Storage
- SATA via rear I/O

Graphics
- One or two DVI-D connectors at front via side card
  - Simultaneous connection of two monitors

I/O
- Ethernet
  - 9-pin D-Sub connector with one or two 10/100Base-T ports instead of two RJ45 connectors
  - Active Management Technology for remote service

Rear I/O
- Two SATA channels (instead of the two side-card channels)
- Two USB 2.0 ports
- One additional Ethernet channel (via side-card connector, no side card can be used in this configuration)
  - Via one PCI Express® link on side board connector

Real-Time Clock
- Buffered by battery instead of GoldCap
  - For retention of time/date data after a power off of more than 8-10 hours. When a 1.8" PATA hard disk is used, no battery can be used on the CPU board

Mechanical
- Side card can be added at left or right side of CPU

Operation Temperature
- Depends on system configuration (CPU, hard disk, heat sink...)
- Minimum: -40°C (all processors)
- Maximum:
  - +60°C (Core Duo T2500, L2400, U2500)
  - +85°C (Celeron® M 423)

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 Hardware

02F015-08 Intel Core Duo T2500, 2 GHz, 1 GB DDR2 DRAM, 2 Gigabit Ethernet, battery, 0..+60°C (945GME chipset)

Related Hardware

02F600-00 2 COM extensions and SATA hard disk slot, for F14 and compatible SBCs, -40..+85°C screened

02F601-00 1 DVI-D and 1 audio at front, SATA hard disk slot, for F14 and compatible SBCs, 4HP, 0..+60°C

02F601-02 2 DVI-D, 1 audio, 1 COM (via SA-Adapter) at front, SATA hard disk slot, for F14 and compatible SBCs, 8HP, 0..+60°C

02F602-00 3U CompactPCI to CompactPCI Express side card with 1 USB, 1 COM, 1 DVI, SATA hard disk slot, for F14 and compatible SBCs, 0..+60°C

02F603-00 3U CompactPCI side card with 2 USB and 1 COM extension, SATA hard disk and CompactFlash slot, for F14 and compatible SBCs, mounted to the right of the SBC, 0..+60°C

02F604-00 3U CompactPCI side card with 1 IEEE 1394 FireWire, 1 DVI, 1 HD audio and 1 COM extension, SATA hard disk slot, for F14 and compatible SBCs, mounted to the right of the SBC, 0..+60°C

02F605-00 1 XMC or PMC slot, for F14 and compatible SBCs, -40..+85°C with qualified components

02F606-00 2 Gigabit Ethernet on Lemo railway compliant connectors, 1 COM extension (SA-Adapter not included), SATA hard disk slot, for F14 and compatible SBCs, conformally coated, -40...+85°C screened

02F608-00 4 SATA and 2 COM ports, additional SATA hard disk slot on-board, for F14 and compatible SBCs, mounted to the right of the SBC, 0..+60°C

Memory

0751-0032 CompactFlash card, 8 GB, Type I, -40..+85°C, fixed bit set

0751-0038 CompactFlash card, 256 MB, Type I, removable, -40..+85°C

0751-0039 CompactFlash card, 512 MB, Type I, removable, -40..+85°C

0751-0040 CompactFlash card, 1 GB, Type I, fixed bit set, -40..+85°C

0751-0041 CompactFlash card, 2 GB, Type I, fixed bit set, -40..+85°C

0751-0042 CompactFlash card, 4 GB, Type I, fixed bit set, -40..+85°C

Systems & Card Cages

0701-0041 19" 4U/84HP CompactPCI Express rack-mount enclosure, 8-slot hybrid backplane, space for hard-disk drives, CD-ROM drive, 300W ATX PSU, 1U fan tray with 2 fans included

0701-0046 CompactPCI 19" 4U/24HP desktop system for 3U cards, 3-slot 3U CompactPCI backplane, system slot right, 1U fan tray with 1 fan, 8 HP space for 1 pluggable PSU

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

0713-0003 CompactPCI 3U 1-slot backplane for stand-alone operation of F14, F15, F17, F18, F19P: 32-bit/33-MHz with rear I/O, 3.3V supply, ATX-power, power, JTAG, IPMB and utility connection, 6x screw connection M3

Software: OS independent

13Y001-06 MDIS5 low-level driver sources (MEN) for LM63 on SMBus for F14, F15, F17, F18, D9, D601, A19 and A20

13Y002-06 MDIS5 low-level driver sources (MEN) for F14, F15, F17, F18, D9, D601, A19 and A20 board monitoring

13Y004-06 MDIS5 low-level driver sources (MEN) for generic SMBus driver for F14, F15, F17, F18, D9, D601, F600 and F601, A19 and A20

13Y007-06 MDIS5 low-level driver sources (MEN) for F14, F15, F17, F18, D9, D601, A19 and A20 board controller

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Ordering Information

Software: Windows

10F014-78	Windows Embedded Standard BSP (MEN) for F14, F15, F17, F18, F19P, G20, XM1, XM1L, XM2, MM1, SC21, DC1 and RC1
13F014-77	Windows Installset (MEN) for F14, F15, F17, F18, D9, D601, A19 and A20
13T001-70	Windows network driver (Intel) for F14, F15, F17, F18, D9, D6, D7, D601, A19, A20 and P601, P602
13T003-70	Windows chipset driver (Intel) for F14, F15, F17, F18, F18E, F19P, D9, D6, D7, D601, A19 and A20
13T005-70	Windows USB2UART driver (FTDI) for F14, F15, F17, F18, F19P, D9, A19, A20, XM2 and XM50 hosts
13T006-70	Windows HD Audio driver (Realtek) for F14, F15, F17, F18, D9 and A19
13T007-70	Windows chipset graphics driver (Intel) for F15, F17, D9, A19 and A20

Software: VxWorks

10F015-60	VxWorks BSP (MEN) for F15, F17 and D9
13Y003-60	VxWorks driver (MEN) for USB-to-UART bridges on F600, F601, F602, F603, F604, F606 and D700

Software: QNX

10F014-40	QNX 6.3 installation support files (MEN) for F14, F15, F17 and D9

Software: Firmware/BIOS

14F015-00	System BIOS for F15, F17 and D9

Documentation

20APPN004	Application Note: How to make a USB stick bootable
20F015-00	F15 User Manual
20F015-ER	F15 Errata

For the most up-to-date ordering information and direct links to other data sheets and downloads, see the F15 online data sheet under » www.men.de.

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