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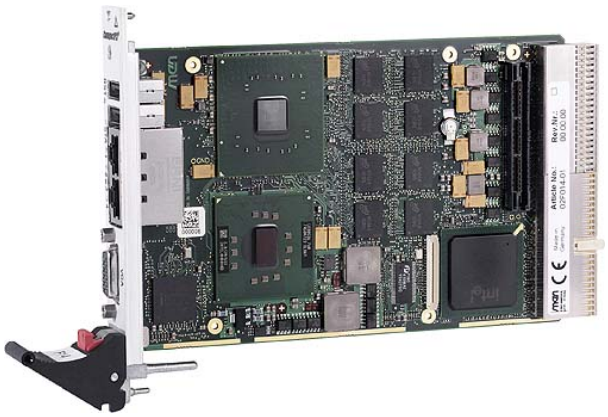
F15 - 3U CompactPCI®/Express Core Duo SBC



- **Intel® Core™ Duo T2500, 2GHz**
- **PCI Express® 6 lanes x1**
- **4HP 32-bit cPCI system master or stand-alone**
- **CompactPCI® (Express) system-slot functionality**
- **Up to 2 GB DDR2 DRAM soldered**
- **CompactFlash® or 1.8" hard disk slot**
- **2 SATA interfaces**
- **Video via VGA and 2 DVI**
- **2 Gigabit Ethernet (PCIe)**
- **Up to 8 USB 2.0**
- **Audio AC'97**
- **Prepared for rugged environments**

Equipped with an Intel® dual-core high-performance Core Duo processor T2500 running at 2GHz, 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 4HP 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® lanes for high-speed communication (such as Gigabit Ethernet, graphics) are supported on the F15. 2 x1 PCIe lanes are used for the two on-board Ethernet interfaces. 4 x1 or 1 x4 PCIe lanes are available on a specific side card.

The DDR2 DRAM is soldered to F15 to guarantee optimum shock and vibration resistance. A robust IDE CompactFlash® device offers nearly unlimited space for user applications. A hard disk slot is also implemented within 4HP height. 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 as well as two USB 2.0 ports.

The F15 can be extended by different side cards either to 8HP for 3U systems or to a 4HP card for 6U systems. Additional functions realized on these side cards include two digital video inputs for flat panel connection via DVI (multimedia), a variety of different UARTs (legacy I/O) or another four USB 2.0 ports, SATA for hard disk or RAID connection and audio AC'97.

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 or L2400 (LV) or: Single-core Intel® Core™ Solo
  - Up to 2.0GHz processor core frequency
  - 667MHz front-side bus frequency
- Chipset
  - Northbridge: Intel® 945GM Express
  - Southbridge: Intel® ICH7-M DH

Memory
- 2MB L2 cache integrated in Core Duo (tbd. for Core Solo)
- Up to 2GB 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 on-board IDE
  - Type I
  - True IDE
  - DMA support

Mass Storage
- Parallel IDE (PATA)
  - One IDE port for local CompactFlash®, or:
  - One IDE hard-disk/CD-ROM port via on-board connector
- Serial IDE (SATA)
  - Two channels via side-board connector
  - Transfer rates up to 300MB/s
  - RAID level 0/1 support

Graphics
- Integrated in 945GM Express chipset
  - 400MHz 256-bit graphics core
  - Up to 10.6 GB/s memory bandwidth
  - Maximum resolution: 2048 x 1536 pixels 16M colors @ 75Hz refresh rate
  - Dynamic Display Modes for flat-panel, wide-screen and Digital TV support
  - Dual screen support via ADD2 digital video devices
- VGA connector at front panel
- Two additional DVI connectors at front panel optional via side card
  - Simultaneous connection of three monitors
  - Two different images, third monitor shows one of the other two images

I/O
- USB
  - Two USB 2.0 ports via Series A connectors at front panel
  - Four USB 2.0 ports via side-board connector
  - Two USB 2.0 ports via rear I/O on request
  - UHCI implementation
  - Data rates up to 480Mbits/s
- Ethernet
  - Two 10/100/1000Base-T Ethernet channels
  - RJ45 connectors at front panel
  - Ethernet controllers are connected by two x1 PCIe lanes
  - On-board LEDs to signal activity status and connection speed
- AC'97 audio
  - Accessible via side-board connector

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

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

PCI Express®
- Two x1 lanes to connect local 1000Base-T Ethernet controllers (250MB/s in each direction)
- One x4 or four x1 lanes for extension through side-board connector

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)

Electrical Specifications
- Supply voltage/power consumption:
  - +5V (-3%/+5%), tbd.
  - +3.3V (-3%/+5%), tbd.
- MTBF: tbd. @ 40°C (derived from MIL-HDBK-217F)

Mechanical Specifications
- Dimensions: conforming to CompactPCI® specification for 3U boards
- Weight: tbd.

Environmental Specifications
- Temperature range (operation):
  - 0..+45°C
  - Extended temperature range -20..+60°C on request
  - Airflow: min. 10m³/h

Technical Data

- 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) with regard to CE conformity

BIOS
- Award BIOS

Software Support
- Windows® 2000/XP (on request)
- Linux (on request)
- VxWorks® (on request)
- 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

Non-Standard Options

IDE Hard Disk
- 1.8" hard disk adapter instead of CompactFlash®

Graphics Connection
- One or two DVI-I connectors at front via side card
- Simultaneous connection of up to three monitors
- Two different images, third monitor shows one of the other two images

Ethernet
- 9-pin D-Sub connector with one or two 10/100Base-T ports instead of two RJ45 connectors
- One 10/100/1000Base-T and one 10/100Base-T channel instead of two 10/100/1000Base-T channels
- Active Management Technology for remote service

Rear I/O
- Two USB 2.0 ports

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

Mechanical
- Extension possibility to 6U height

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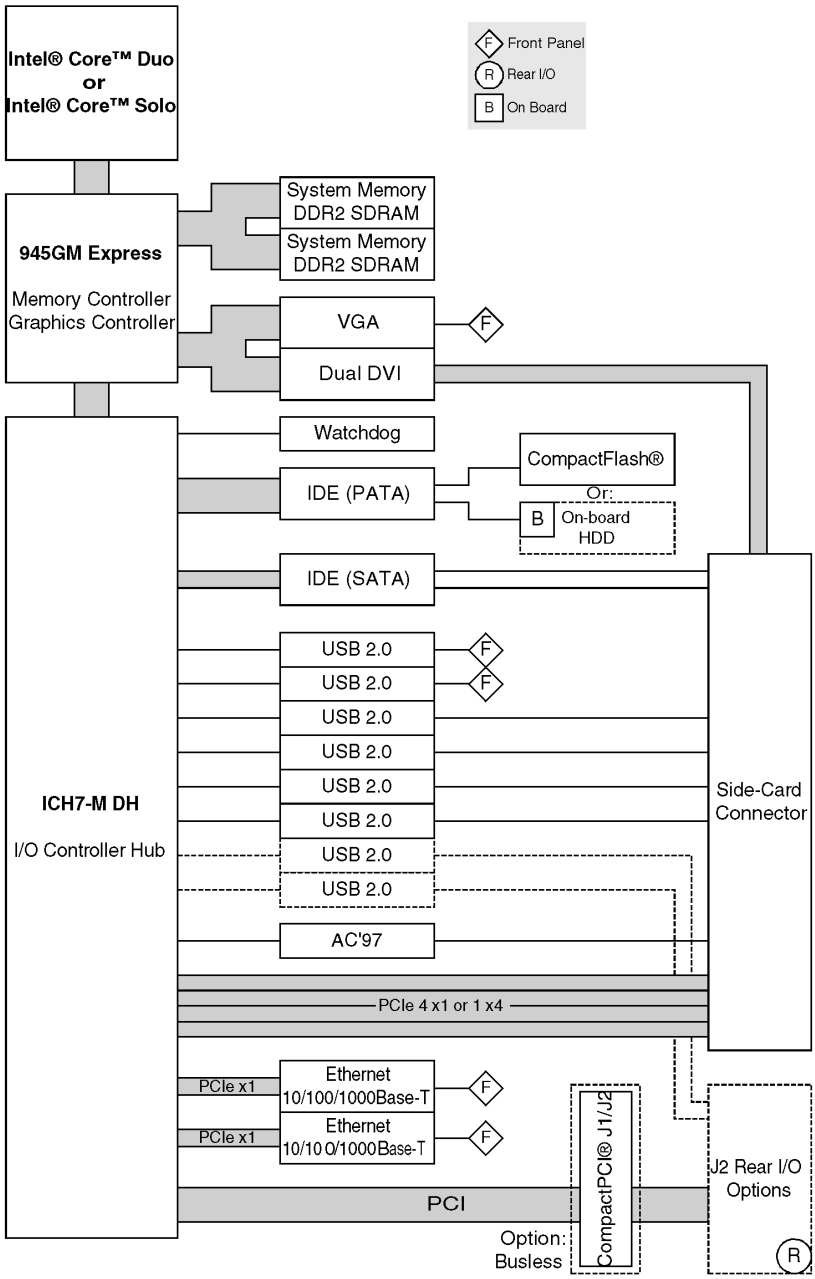
Diagram



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Configuration Overview

Standard Configurations

Article No.	CPU Type	Clock	System RAM	CFlash	Operation Temperature
02F015-00	T2500	2 GHz	1 GB	0 MB	0..+45°C

Options

CPU Type/Clock	Core DuoT2500 2GHz	Core Duo L2400 1.66GHz LV	Core Solo tbd.	
System RAM	256 MB	512 MB	1 GB	2 GB
CFlash	0 MB	..	maximum available	
Operation Temperature	0..+45°C	-20..+60°C		

Related Products

Standard Hardware

02F015-00	Intel® Core™ Duo processor 2GHz, 1GB DDR2 DRAM, 2 Gigabit Ethernet, 0..+45°C
02F600-00	3U CompactPCI® side card with 2 COM extensions and SATA hard disk slot, for F14 and compatible SBCs, 0..+60°C

Accessories

0710-0019	PATA hard disk 1.8", 20GB+, including mounting material, +5..+60°C

Systems & Card Cages

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

Software

13F014-77	Windows® driver installation package for F14/F15
13Y001-06	MDIS4™/2004 low-level driver sources for LM63 on SMBus
13Y001-70	MDIS4™/2004 Windows® W2K driver for LM63 on SMBus
13Y002-06	MDIS4™/2004 low-level driver sources for F14/F15 board monitoring
13Y002-70	MDIS4™/2004 Windows® driver for F14/F15 board monitoring
13Y004-06	MDIS4™/2004 low-level driver sources for generic SMBus driver
13Y004-70	MDIS4™/2004 Windows® driver for SMBus devices

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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