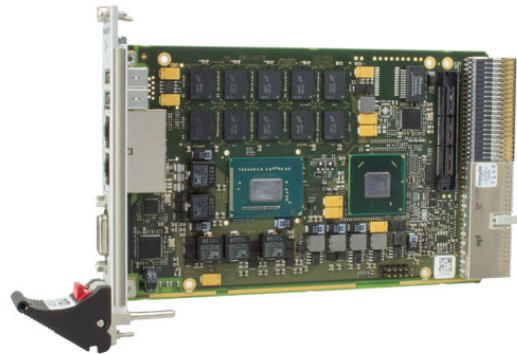


# F22P

## Embedded Single Board Computer with Intel Core i3 / i5 / i7 3U CompactPCI PlusIO

- » *Intel Core i7, 3rd generation*
- » *Quad-core 64-bit processor*
- » *For CompactPCI 2.0 systems or CompactPCI PlusIO 2.30 hybrid systems (2.0 and CPCI-S.0)*
- » *Up to 16 GB DDR3 DRAM soldered, ECC*
- » *microSD card and mSATA slots*
- » *Front I/O: VGA, 2 Gbit Ethernet, 2 USB*
- » *Rear I/O: 4 PCIe, 4 USB, 4 SATA, 1 Gbit Ethernet*
- » *Other I/O (onboard, side card): SATA, SDVO, HDMI/ Display Port, HD audio, USB, UART etc.*
- » *2.3 to 3.3 GHz Turbo Boost, Hyper-Threading, Active Management Technology*
- » *Open CL 1.1 support*



The F22P versatile 4HP/3U single-board computer is a continuation of MEN's proven range of Intel CPU boards. It is equipped with the high-performance third generation Intel Core i7 processor running at up to 3.3 GHz maximum turbo frequency with full 64-bit support. The CPU card delivers an excellent graphics performance and is designed especially for embedded systems which require high computing performance with low power consumption.

The F22P offers a 32-bit/33-MHz CompactPCI bus interface and can also be used without a bus system. 4 USB 2.0 ports, 4 PCI Express x1 links, 2 SATA 3 Gb/s and 2 SATA 6 Gb/s interfaces as well as one Gigabit Ethernet are led to the J2 rear I/O connector which is compatible with the PICMG 2.30 CompactPCI PlusIO specification.

The F22P is equipped with a state-of-the-art fast DDR3 DRAM which is soldered to the F22P to guarantee optimum shock and vibration resistance. An mSATA disk and a microSD card device which are connected via a USB interface and a SATA channel offer nearly unlimited space for user applications.

The standard I/O available at the front panel of F22P includes graphics on a VGA connector, two PCIe-driven Gigabit Ethernet as well as two USB2.0 ports. The F22P can be extended by different side cards. Additional functions include a digital video interface for flat panel connection via DVI (multimedia), a variety of different

UARTs or another four USBs, SATA for hard disk connection and HD audio.

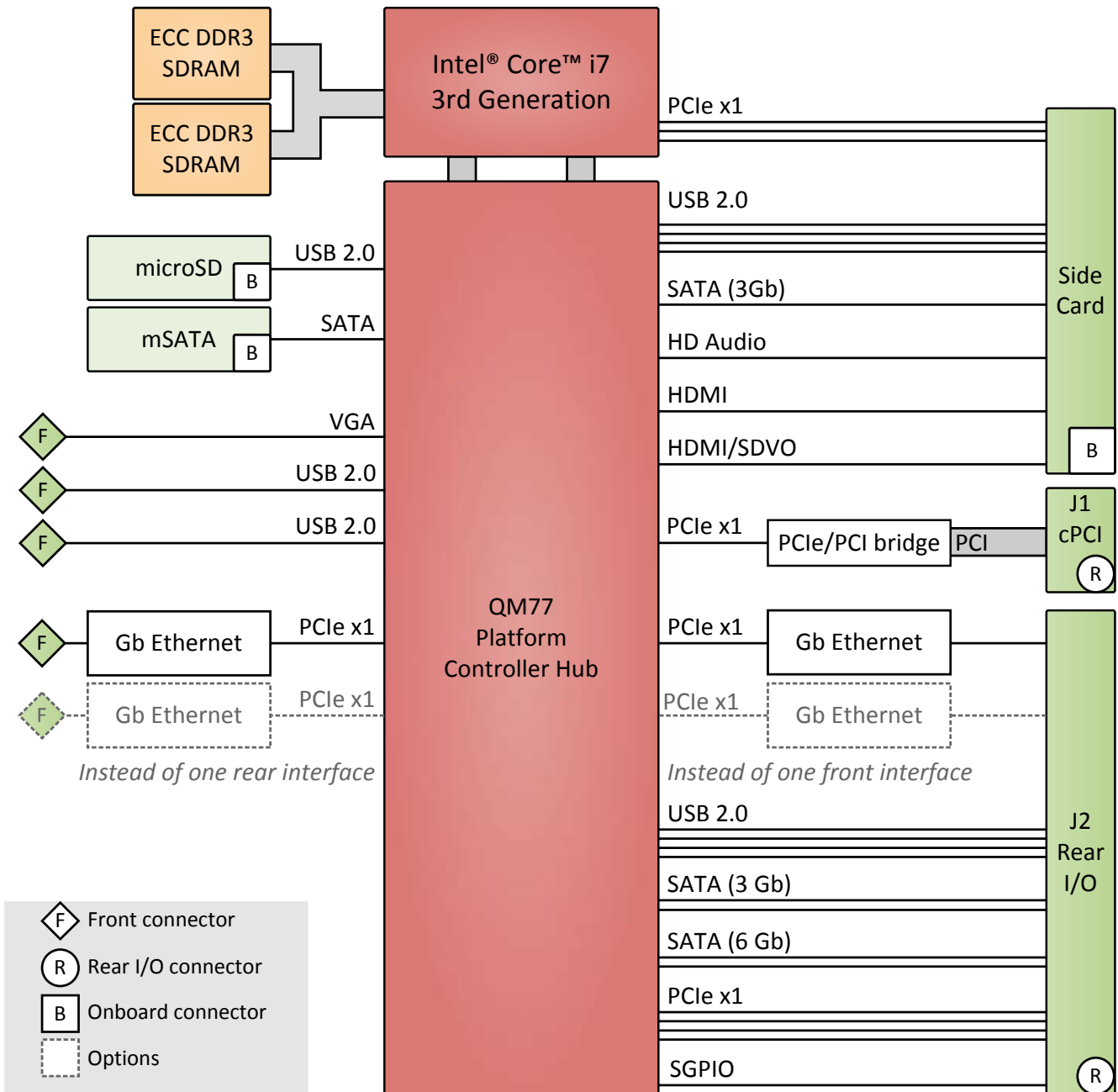
Thermal supervision of the processor and a watchdog for the operating system complete the functionality of the F22P. A TPM (Trusted Platform Module) chip is also assembled.

The F22P operates in Windows and Linux environments as well as under real-time operating systems that support Intel's multi-core architecture. The InsydeH2O EFI BIOS was specially designed for embedded system applications.

Equipped with Intel components from the Intel Embedded Line, the F22P has a guaranteed minimum availability of 7 years.

The F22P is suited 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 F22P comes with a tailored passive heat sink within 4 HP height. The robust design of the F22P makes 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 F22P is also ready for coating so that it can be used in humid and dusty environments.



## Diagram

## CPU

- The following CPU types are supported:
  - Intel Celeron 1047UE, Dual Core, 1.4 GHz, 2 MB Cache, 17 W
  - Intel Celeron 927UE, Single Core, 1.5 GHz, 1 MB Cache, 17 W (without PCI Express on side card)
  - Intel Celeron 1020E, Dual Core, 2.2 GHz, 2 MB Cache, 35 W
  - Intel Core i3-3120ME, Dual Core, 2.4 GHz, 3 MB Cache, 35 W
  - Intel Core i3-3217UE, Dual Core, 1.6 GHz, 3 MB Cache, 17 W
  - Intel Core i5-3610ME, Dual Core, 2.7 GHz, 3 MB Cache, 35 W
  - Intel Core i7-3517UE, Dual Core, 1.7 GHz, 4 MB Cache, 17 W
  - Intel Core i7-3555LE, Dual Core, 2.5 GHz, 4 MB Cache, 25 W
  - Intel Core i7-3612QE, Quad Core, 2.1 GHz, 6 MB Cache, 35 W
  - Intel Core i7-3615QE, Quad Core, 2.3 GHz, 6 MB Cache, 45 W

## Chipset

- QM77 Platform Controller Hub (PCH)

## Memory

- System RAM
  - Soldered DDR3, ECC support
  - 2 GB, 4 GB, 8 GB, or 16 GB
- Boot Flash
  - 64 Mbits

## Mass Storage

- The following mass storage devices can be assembled:
  - microSD card
  - mSATA disk

## Graphics

- Integrated in QM77 chipset
- 650 MHz graphics base frequency
- 1.2 GHz graphics maximum dynamic frequency
- Simultaneous connection of two monitors

## Front Interfaces

- Video
  - One VGA connector
  - Additional interfaces are available via a side card
- USB
  - Two Type A connectors, USB 2.0 (480 Mbit/s)
- Ethernet
  - Two RJ45 connectors, 1000BASE-T (1 Gbit/s), or
  - One RJ45 connector, 1000BASE-T (1 Gbit/s), or
  - One 9-pin D-Sub connector, two 100BASE-T (100 Mbit/s), or
  - One 9-pin D-Sub connector, one 100BASE-T (100 Mbit/s)
  - One front channel can optionally be led to the backplane
  - Two link and activity LEDs per channel
- Front-panel LED for board status
- Reset button

## Rear Interfaces

- Compatible with PICMG 2.30 CompactPCI PlusIO
  - 1PCI133/4PCIE5/2SATA3/2SATA6/4USB2/1ETH1G, or
  - 1PCI133/4PCIE5/2SATA3/2SATA6/4USB2/2ETH1G
- SATA
  - Two channels, SATA Revision 3.x (6 Gbit/s), RAID level 0/1/5/10 support
  - Two channels, SATA Revision 2.x (3 Gbit/s), RAID level 0/1/5/10 support
- USB
  - Four channels, USB 2.0 (480 Mbit/s)
- Ethernet
  - One channel, 1000BASE-T (1 Gbit/s), or
  - Two channels, 1000BASE-T (1 Gbit/s)
  - One front channel can optionally be led to the backplane
- PCI Express
  - Four x1 links (500 MB/s per link), PCIe 2.x (5 Gbit/s per lane)

## Onboard Interfaces

- An onboard connector allows a side card to be plugged onto the CPU board to add front panel connections or mass storage devices. A range of standard side cards is available to implement different functions.
- DisplayPort/HDMI
  - One channel
- DisplayPort/HDMI/SDVO
  - One channel
- HD Audio
  - One channel
- SATA
  - One channel, SATA Revision 2.x (3 Gbit/s), RAID level 0/1/5/10 support
- USB
  - Four channels, USB 2.0 (480 Mbit/s)
- PCI Express
  - Three x1 links (500 MB/s per link), PCIe 2.x (5 Gbit/s per lane)

## Supervision and Control

- Board controller
- Watchdog timer
- Temperature measurement
- Real-time clock with supercapacitor or battery backup
- Intel Active Management Technology

## Backplane Standard

- CompactPCI Core Specification PICMG 2.0 R3.0
  - System slot
  - 32-bit/33-MHz CompactPCI bus
  - V(I/O): +3.3 V (+5 V tolerant)
  - The board can be supplied with +5V only, all other voltages are generated on the board. The backplane connectors are used for power supply only.

## Electrical Specifications

- Supply voltages
  - +5V (-3%/+5%)
  - +3.3V (-3%/+5%)
  - +12V (-10%/+10%)
- Power consumption
  - 45 W max.
  - 12.41 W with Intel Core i7-3615QE CPU with Windows XP operating system and 1 Gb Ethernet connection (model 02F022P01)

## Mechanical Specifications

- Dimensions: 3U, 4 HP
- Weight: 304 g (model 02F022P00)

## Environmental Specifications

- Temperature range (operation)
  - -40°C to +85°C (model 02F022P00)
  - Airflow 1.5 m/s
  - Depends on system configuration (CPU, hard disk, heat sink...)
- Temperature range (storage): -40°C to +85°C
- Cooling concept
  - Air-cooled, or
  - Conduction-cooled in MEN CCA frame
- Relative humidity (operation): max. 95% non-condensing
- Relative humidity (storage): max. 95% non-condensing
- Altitude: -300 m to +2000 m
- Shock: 50 m/s<sup>2</sup>, 30 ms
- Vibration (Function): 1 m/s<sup>2</sup>, 5 Hz to 150 Hz
- Vibration (Lifetime): 7.9 m/s<sup>2</sup>, 5 Hz to 150 Hz

## Reliability

- MTBF: 549 414 h @ 40°C according to IEC/TR 62380 (RDF2000) (model 02F022P00)

## Safety

- Flammability (PCBs)
  - UL 94 V-0

## EMC Conformity

- EN 55022 (radio disturbance)
- IEC 61000-4-3 (electromagnetic field immunity)
- IEC 61000-4-4 (burst)
- IEC 61000-4-6 (conducted disturbances)

## Software Support

- Note that 64-bit hardware technology can be used in an optimal way with 64-bit operating system support
- Windows
- Linux
- VxWorks (on request)
- 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.**

## BIOS

- InsydeH2O UEFI Framework

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### **Up-to-date information, documentation and ordering information:**

[www.men.de/products/f22p/](http://www.men.de/products/f22p/)

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