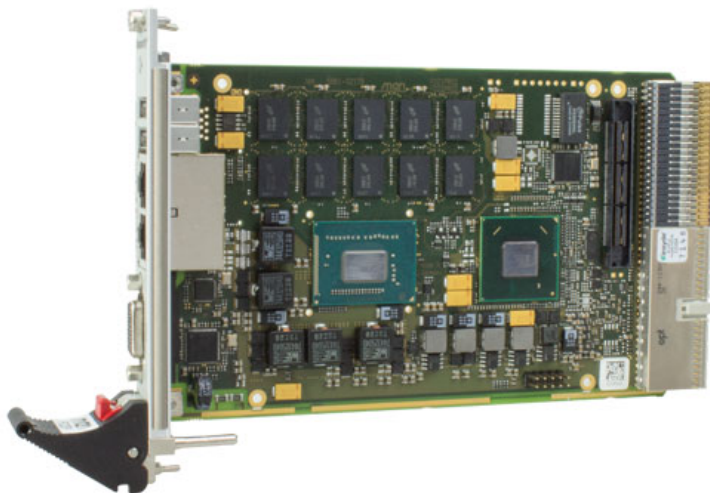


# F22P – 3U CompactPCI® PlusIO Intel® Core™ i7 CPU Board

- 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 and offering the latest quad core processor architecture from Intel® 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 USB 2.0 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.

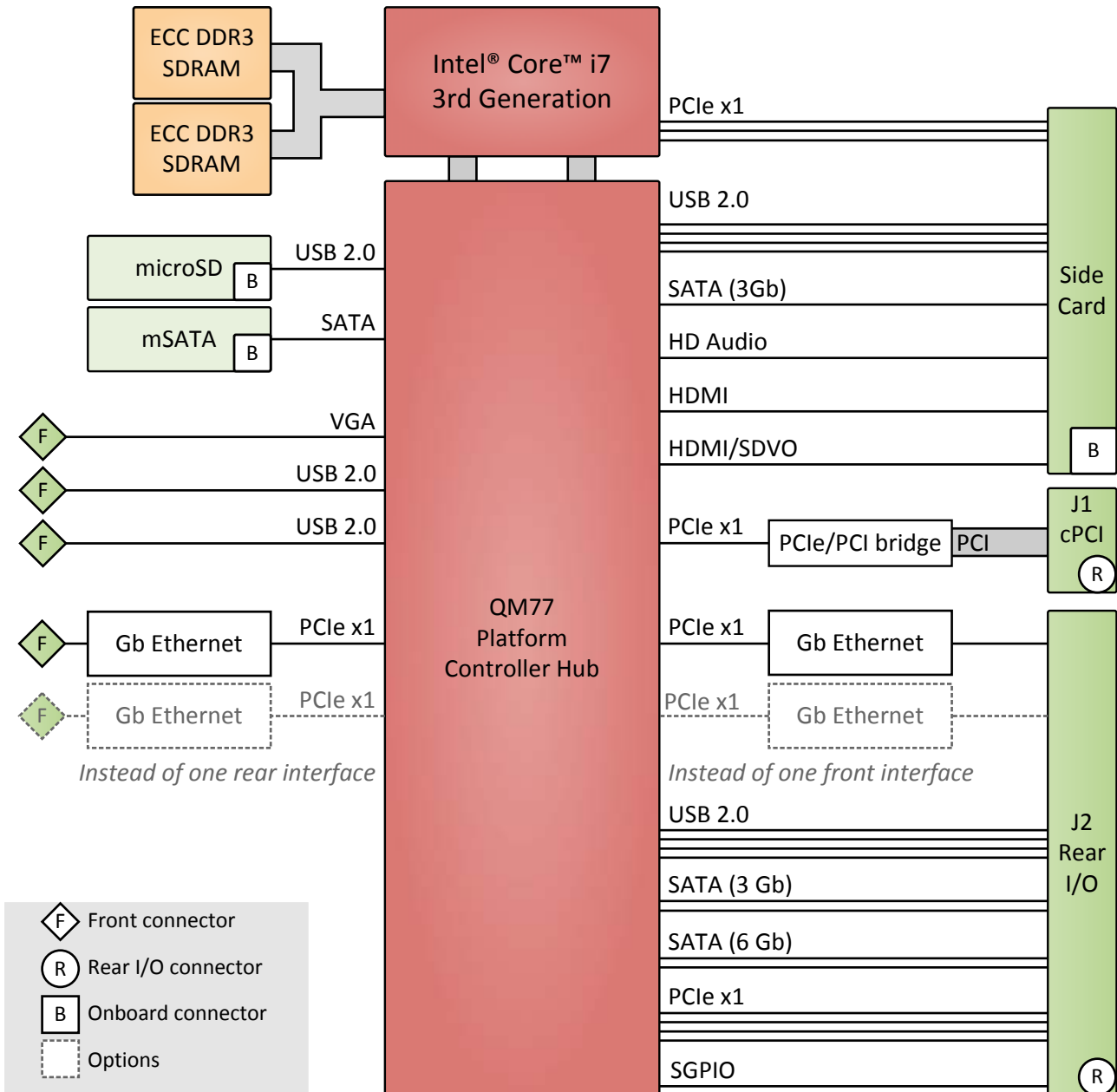
The F22P operates in Windows® and Linux environments as well as under real-time operating systems that support Intel®'s multi-core architecture. The InsydeH2O™ EFI BIOS was specially designed for embedded system applications.

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

The F22P 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 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



## Technical Data

<b>CPU</b>	<ul style="list-style-type: none"> <li>■ Intel® Core™ i7-3615QE <ul style="list-style-type: none"> <li>□ 2.3 GHz processor core frequency</li> <li>□ 3.3 GHz maximum turbo frequency</li> <li>□ 1066 MHz system bus frequency</li> </ul> </li> <li>■ Chipset <ul style="list-style-type: none"> <li>□ QM77 Platform Controller Hub (PCH)</li> </ul> </li> </ul>
<b>Memory</b>	<ul style="list-style-type: none"> <li>■ Up to 6 MB last level cache integrated in i7</li> <li>■ Up to 16 GB SDRAM system memory <ul style="list-style-type: none"> <li>□ Soldered</li> <li>□ DDR3 with ECC support</li> <li>□ 1066/1333/1600 MHz memory bus frequency</li> </ul> </li> <li>■ 64 Mbits boot Flash</li> <li>■ Serial EEPROM 2kbits for factory settings</li> </ul>
<b>Mass Storage</b>	<ul style="list-style-type: none"> <li>■ microSD™ card interface <ul style="list-style-type: none"> <li>□ Connected via one USB port</li> </ul> </li> <li>■ mSATA disk slot <ul style="list-style-type: none"> <li>□ Connected via one SATA channel</li> </ul> </li> <li>■ Serial ATA (SATA) <ul style="list-style-type: none"> <li>□ Four channels via rear I/O, one channel via side-card connector, one channel for mSATA disk</li> <li>□ 4 SATA 3 Gbit/s interfaces, 2 SATA 6 Gbit/s interfaces (rear I/O)</li> <li>□ RAID level 0/1/5/10 support</li> </ul> </li> </ul>
<b>Graphics</b>	<ul style="list-style-type: none"> <li>■ Integrated in QM77 chipset <ul style="list-style-type: none"> <li>□ 650 MHz graphics base frequency</li> <li>□ 1.2 GHz graphics maximum dynamic frequency</li> </ul> </li> <li>■ VGA connector at front panel</li> <li>■ Two digital display interface ports available via side-card connector <ul style="list-style-type: none"> <li>□ DisplayPort®, HDMI and SDVO (SDVO only on one interface)</li> <li>□ One additional DVI connector at front panel optional via side card</li> <li>□ Simultaneous connection of two monitors</li> </ul> </li> </ul>
<b>I/O</b>	<ul style="list-style-type: none"> <li>■ USB <ul style="list-style-type: none"> <li>□ Two USB 2.0 ports via Series A connectors at front panel</li> <li>□ Four USB 2.0 ports via side-card connector</li> <li>□ Four USB 2.0 ports via rear I/O</li> <li>□ One USB for connection of microSD™</li> <li>□ EHCI implementation</li> <li>□ Data rates up to 480 Mbit/s</li> </ul> </li> <li>■ Ethernet <ul style="list-style-type: none"> <li>□ Two 10/100/1000Base-T Ethernet channels at the front</li> <li>□ RJ45 connectors at front panel</li> <li>□ Ethernet controllers are connected by two x1 PCIe® links</li> <li>□ Onboard LEDs to signal activity status and connection speed</li> <li>□ One 10/100/1000Base-T Ethernet channel via rear I/O</li> <li>□ Ethernet controller is connected by one x1 PCIe® link</li> </ul> </li> <li>■ High Definition (HD) audio <ul style="list-style-type: none"> <li>□ Accessible via side-card connector</li> </ul> </li> </ul>
<b>Front Connections (Standard)</b>	<ul style="list-style-type: none"> <li>■ VGA</li> <li>■ Two USB 2.0 (Series A)</li> <li>■ Two Ethernet (RJ45)</li> </ul>
<b>Rear I/O (PICMG 2.30)</b>	<ul style="list-style-type: none"> <li>■ Four SATA</li> <li>■ Four USB</li> <li>■ One Gigabit Ethernet (second rear interface instead of one front interface as an assembly option)</li> <li>■ Four PCI Express® x1 links</li> <li>■ Compatible with PICMG 2.30 CompactPCI® PlusIO <ul style="list-style-type: none"> <li>□ 1PCI33/4PCIE5/2SATA3/2SATA6/4USB2/1(2)ETH1G</li> </ul> </li> </ul>

## Technical Data

<b>Miscellaneous</b>	<ul style="list-style-type: none"> <li>■ Board controller</li> <li>■ Real-time clock, buffered by a GoldCap or alternatively a battery (5 years life cycle)</li> <li>■ Watchdog timer</li> <li>■ Temperature measurement</li> <li>■ One user LED</li> <li>■ Reset button</li> </ul>
<b>PCI Express®</b>	<ul style="list-style-type: none"> <li>■ Three x1 links to connect local 1000Base-T Ethernet controllers <ul style="list-style-type: none"> <li>□ Data rate 250 MB/s in each direction (2.5 Gbit/s per lane)</li> </ul> </li> <li>■ Four x1 links via rear I/O <ul style="list-style-type: none"> <li>□ Data rate up to 500 MB/s in each direction (5 Gbit/s per lane)</li> </ul> </li> <li>■ Three x1 links for extension through side-card connector <ul style="list-style-type: none"> <li>□ Data rate up to 500 MB/s in each direction (5 Gbit/s per lane)</li> </ul> </li> </ul>
<b>CompactPCI® Bus</b>	<ul style="list-style-type: none"> <li>■ Connection via PCI Express® link from processor using PCI-Express-to-PCI-Bridge</li> <li>■ Compliance with CompactPCI® Core Specification PICMG 2.0 R3.0</li> <li>■ System slot</li> <li>■ 32-bit/33-MHz CompactPCI® bus</li> <li>■ V(I/O): +3.3V (+5V tolerant)</li> </ul>
<b>Busless Operation</b>	<ul style="list-style-type: none"> <li>■ Board can be supplied with +5V only, all other voltages are generated on the board</li> <li>■ Backplane connectors used only for power supply</li> </ul>
<b>Electrical Specifications</b>	<ul style="list-style-type: none"> <li>■ Supply voltage/power consumption (board versions with i7-2715QE processor) <ul style="list-style-type: none"> <li>□ +5V (-3%/+5%), 9.6 A typ., 14.4 A max.</li> <li>□ +3.3V (-3%/+5%), 1.8 A (3 Gb Ethernet), 1.4 A (2 Gb Ethernet), 1 A (1 Gb Ethernet)</li> <li>□ +12V (-10%/+10%), approx. 10 mA</li> <li>□ 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.) No external 3.3 V voltage may be applied in that case!</li> </ul> </li> </ul>
<b>Mechanical Specifications</b>	<ul style="list-style-type: none"> <li>■ Dimensions: conforming to CompactPCI® specification for 3U boards</li> <li>■ Front panel: 4HP with ejector</li> <li>■ Weight: 204 g (w/o heat sink)</li> </ul>
<b>Environmental Specifications</b>	<ul style="list-style-type: none"> <li>■ Temperature range (operation): <ul style="list-style-type: none"> <li>□ Depends on system configuration (CPU, hard disk, heat sink...)</li> <li>□ Maximum: +85°C</li> <li>□ Minimum: -40°C (all processors)</li> <li>□ Conditions: airflow 1.5m/s, typical power dissipation: 12 W (board versions with i7-2715QE processor) with Windows® XP operating system and 1 Gb Ethernet connection</li> </ul> </li> <li>■ Temperature range (storage): -40..+85°C</li> <li>■ Relative humidity (operation): max. 95% non-condensing</li> <li>■ Relative humidity (storage): max. 95% non-condensing</li> <li>■ Altitude: -300m to + 2,000m</li> <li>■ Shock: 50 m/s<sup>2</sup>, 30 ms</li> <li>■ Vibration (Function): 1 m/s<sup>2</sup>, 5 Hz - 150 Hz</li> <li>■ Vibration (Lifetime): 7.9 m/s<sup>2</sup>, 5 Hz - 150 Hz</li> <li>■ Conformal coating on request</li> </ul>
<b>MTBF</b>	<ul style="list-style-type: none"> <li>■ 549 414 h @ 40°C according to IEC/TR 62380 (RDF2000)</li> </ul>
<b>Safety</b>	<ul style="list-style-type: none"> <li>■ PCB manufactured with a flammability rating of 94V-0 by UL recognized manufacturers</li> </ul>
<b>EMC</b>	<ul style="list-style-type: none"> <li>■ Tested according to EN 55022 (radio disturbance), IEC 61000-4-3 (electromagnetic field immunity), IEC 61000-4-4 (burst) and IEC 61000-4-6 (conducted disturbances)</li> </ul>
<b>BIOS</b>	<ul style="list-style-type: none"> <li>■ InsydeH2O™ UEFI Framework</li> </ul>

## Technical Data

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### Intel® Active Management Technology

- Manageability Engine in Chipset
- Network Filters in Chipset
- Dedicated Flash Storage Area
- Out of Band (OOB) Access
  - Power off Access
  - Independent of OS status
  - Power status control
  - Keyboard-Video-Mouse (KVM) Viewer (VNC-compatible)
  - IDE-Redirect
  - Serial-over-LAN

### 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® (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
- [For more information on supported operating system versions and drivers see Downloads.](#)

# Configuration & Options

## Standard Configurations

Article No.	CPU Type	Clock	Cores/Threads	System RAM	mSATA/microSD	Operating Temperature
02F022P00	Celeron 1047UE	1.4 GHz	2/2	2 GB	None	-40..+85°C
02F022P01	Core i7-3615QE	2.3 GHz	4/8	4 GB	None	0..+45°C

## Options

<b>CPU</b>	<ul style="list-style-type: none"> <li>■ Intel® Core™ i7-3615QE                             <ul style="list-style-type: none"> <li>□ Quad Core, 2.3 GHz, 6 MB Cache, 45 W</li> </ul> </li> <li>■ Intel® Core™ i7-3612QE                             <ul style="list-style-type: none"> <li>□ Quad Core, 2.1 GHz, 6 MB Cache, 35 W</li> </ul> </li> <li>■ Intel® Core™ i7-3555LE                             <ul style="list-style-type: none"> <li>□ Dual Core, 2.5 GHz, 4 MB Cache, 25 W</li> </ul> </li> <li>■ Intel® Core™ i7-3517UE,                             <ul style="list-style-type: none"> <li>□ Dual Core, 1.7 GHz, 4 MB Cache, 17 W</li> </ul> </li> <li>■ Intel® Core™ i5-3610ME                             <ul style="list-style-type: none"> <li>□ Dual Core, 2.7 GHz, 3 MB Cache, 35 W</li> </ul> </li> <li>■ Intel® Core™ i3-3120ME                             <ul style="list-style-type: none"> <li>□ Dual Core, 2.4 GHz, 3 MB Cache, 35 W</li> </ul> </li> <li>■ Intel® Core™ i3-3217UE                             <ul style="list-style-type: none"> <li>□ Dual Core, 1.6 GHz, 3 MB Cache, 17 W</li> </ul> </li> <li>■ Intel® Celeron® 1020E                             <ul style="list-style-type: none"> <li>□ Dual Core, 2.2 GHz, 2 MB Cache, 35 W</li> </ul> </li> <li>■ Intel® Celeron® 1047UE                             <ul style="list-style-type: none"> <li>□ Dual Core, 1.4 GHz, 2 MB Cache, 17 W</li> </ul> </li> <li>■ Intel® Celeron® 927UE (without PCI Express® on side card)                             <ul style="list-style-type: none"> <li>□ Single Core, 1.5 GHz, 1 MB Cache, 17 W</li> </ul> </li> </ul>
<b>Memory</b>	<ul style="list-style-type: none"> <li>■ System RAM                             <ul style="list-style-type: none"> <li>□ Up to 16 GB</li> </ul> </li> <li>■ microSD™ card                             <ul style="list-style-type: none"> <li>□ 0 MB up to maximum available</li> </ul> </li> <li>■ mSATA disk                             <ul style="list-style-type: none"> <li>□ 0 MB up to maximum available</li> </ul> </li> </ul>
<b>Graphics</b>	<ul style="list-style-type: none"> <li>■ One DVI-D connector at front via side card                             <ul style="list-style-type: none"> <li>□ Simultaneous connection of two monitors</li> </ul> </li> </ul>
<b>I/O</b>	<ul style="list-style-type: none"> <li>■ Ethernet                             <ul style="list-style-type: none"> <li>□ 9-pin D-Sub connector with one or two 10/100Base-T ports instead of two RJ45 connectors</li> <li>□ Second Ethernet at rear I/O connector J2 instead of one interface at the front</li> </ul> </li> <li>■ Rear I/O                             <ul style="list-style-type: none"> <li>□ VGA on CompactPCI® J2 connector as an assembly option for the conduction-cooled board version</li> <li>□ VBATT on CompactPCI® J1 connector as an assembly option for the conduction-cooled board version</li> </ul> </li> </ul>
<b>Mechanical</b>	<ul style="list-style-type: none"> <li>■ Side card can be added at left or right side of CPU</li> </ul>
<b>Operating Temperature</b>	<ul style="list-style-type: none"> <li>■ Depends on system configuration (CPU, hard disk, heat sink...)</li> <li>■ Maximum: +85°C</li> <li>■ Minimum: -40°C (all processors)</li> </ul>
<b>Cooling Concept</b>	<ul style="list-style-type: none"> <li>■ Also available with conduction cooling in MEN CCA frame</li> </ul>
<b>Software Support</b>	<ul style="list-style-type: none"> <li>■ VxWorks® (on request)</li> <li>■ QNX® (on request)</li> </ul>

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

## Ordering Information

<b>Standard F22P Models</b>	<b>02F022P00</b>	F22P, 3U CompactPCI® (PICMG 2.0) and CompactPCI® PlusIO (PICMG 2.30) SBC, Intel® Celeron1047UE 1.4 GHz, 2 GB DDR3 DRAM with ECC, -40..+85°C screened
	<b>02F022P01</b>	F22P, 3U CompactPCI® (PICMG 2.0) and CompactPCI® PlusIO (PICMG 2.30) SBC, Intel® Core™ i7-3615QE, 2.3 GHz, 4 GB DDR3 DRAM with ECC, 0..+45°C
<b>Related Hardware</b>	<b>02F600-00</b>	2 COM extensions and SATA hard disk slot, for F14 and compatible SBCs, -40..+85°C screened
	<b>02F601-00</b>	1 DVI-D and 1 audio at front, SATA hard disk slot, for F14 and compatible SBCs, 4HP, 0..+60°C
	<b>02F603-00</b>	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
	<b>02F604-00</b>	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
	<b>02F606-00</b>	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
	<b>02F608-00</b>	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
	For more information on the interoperability of the side cards with the respective CPU boards please see the <a href="#">extension card compatibility matrix (PDF)</a>	
	<b>08CT12-00</b>	CompactPCI® PlusIO rear transition module 3U/80mm, 2 Ethernet, 4 USB, 4 SATA, 4 PCIe® x1, -40°C..+85°C qualified
<b>Memory</b>	<b>0751-0046</b>	MicroSD card, 2 GB, -40..+85°C
	<b>0751-0051</b>	SSD mSATA, 8 GB, -40..+85°C
	<b>0751-0052</b>	MicroSD card, 4 GB, -40..+85°C
<b>Systems &amp; Card Cages</b>	<b>0701-0046</b>	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
	<b>0701-0056</b>	CompactPCI® 19" 4U/84HP rack-mount enclosure for 3U cards (vertical), 4+4-slot 3U CompactPCI® / CompactPCI® 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
MEN delivers turn-key systems completely installed (hardware, operating system, accessories), wired and tested. Different rack sizes, power supplies and backplanes on request. For details please contact your local sales representative.		
<b>Miscellaneous Accessories</b>	<b>0713-0003</b>	CompactPCI® 3U 1-slot backplane for stand-alone operation of F14, F15, F17, F18, F19P, F21P, F22P, F23P: 32-bit/33-MHz with rear I/O, 3.3V supply, ATX-power, power, JTAG, IPMB and utility connection, 6x screw connection M3
<b>Software: Linux</b>	This product is designed to work under Linux. See below for all available separate software packages.	
	<b>13MD05-90</b>	MDIS5 System (and Device Driver) Package (MEN) for Linux. This software package includes most standard device drivers available from MEN.

## Ordering Information

<b>Software: Windows®</b>	This product is designed to work under Windows®. See below for all available separate software packages.
<b>10Y000-78</b>	Windows® Embedded Standard 7 BSP for F19P, F21P, F22P, F23P, G20, G22, CB70C, CB70, XM2, MM2, BC50M, BC50I, BL50W, BL50S, BC70M, BL70S, BL70W, BL70E, DC2, DC13, F205, F206, F210, F215, F216, G215, P506, P507 and P511
<b>13F021P77</b>	Windows® Installset (MEN) for F21P and F22P (Includes all free drivers developed by MEN for the supported hardware.)
<b>13T003-70</b>	Windows® chipset driver (Intel®) for F14, F15, F17, F18, F18E, F19P, F21P, F22P, G20, G22, XM2, CB70C, D9, D6, D7, D601, A19 and A20
<b>13T005-70</b>	Windows® USB2UART driver (FTDI) for F14, F15, F17, F18, F19P, F21P, F22P, F23P, D9, A19, A20, XM2 and XM50 / XM51 / F50P / F50C hosts
<b>13T006-70</b>	Windows® HD Audio driver (Realtek) for F14, F15, F17, F18, F19P, F21P, F22P, F23P, D9 and A19
<b>13T010-70</b>	Windows® 32-bit network driver (Intel®) for XM1, XM1L, XM2, MM2, CB70C, F11S, F18, F18E, F19P, F21P, F22P, G20, G22, GM1, GM2, GM3, G211, G211F, SC24, BC50I, BC50M, BL50W, BL50S, BL70W and BL70S
<b>13T020-70</b>	Windows® 64-bit network driver (Intel®) for F18, F18E, F19P, F21P, F22P, G20, G22, GM1, GM2, GM3, G211, G211F, XM2, CB70C, SC24, BC50I, BC50M, BL50W, BL50S, BL70W and BL70S
<b>13T029-70</b>	Windows® Intel® Management Engine Driver (Intel®) for G22, F22P and CB70C
<b>13T034-70</b>	Windows® 7/8 32-bit graphics driver (Intel®) for F22P, G22, CB70C, SC25, BL70W and BL70S
<b>13T035-70</b>	Windows® 7/8 64-bit graphics driver (Intel®) for F22P, G22, CB70C, SC25, BL70W and BL70S

<b>Software: Firmware/BIOS</b>	This product includes a specially adapted BIOS.
<b>14F022P00</b>	System BIOS for F22P

<b>Software: Miscellaneous</b>	Intel® software development products such as analyzers, compilers, threading tools etc. can be downloaded under <a href="http://www.intel.com/cd/software/products/asmo-na/eng/index.htm">www.intel.com/cd/software/products/asmo-na/eng/index.htm</a> . IA-32 Intel® Architecture Software Developer's Manuals are available under <a href="http://www.intel.com/products/processor/manuals/index.htm">www.intel.com/products/processor/manuals/index.htm</a> .
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For operating systems not mentioned here [contact MEN sales](#).

<b>Documentation</b>	<p>Compare Chart 3U CompactPCI® Serial CPU and I/O cards » <a href="#">Download</a></p> <p>Compare Chart 3U CompactPCI® / PlusIO CPU cards » <a href="#">Download</a></p> <p>Compare Chart 3U CompactPCI® / PlusIO peripheral cards » <a href="#">Download</a></p> <p>Compare Chart 3U CompactPCI® / PlusIO extension cards » <a href="#">Download</a></p> <p>For more information on the interoperability of the side cards with the respective CPU boards please see the <a href="#">extension card compatibility matrix (PDF)</a></p>
<b>20F022P00</b>	F22P User Manual
<b>20F022PER</b>	F22P Errata
<b>21APPN014</b>	Application Note: Switching on the AMT function
<b>21APPN015</b>	Application Note: Using Real-Time Operating Systems on MEN CPUs with InsydeH2O™ UEFI BIOS
<b>21APPN016</b>	Application Note: Accessing SMBus under Linux Kernel 3.2 on MEN Intel® Boards



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