# F19P – 3U CompactPCI® PlusIO Intel® Core™ 2 Duo CPU Board

- **Intel® Core™ 2 Duo SP9300, 2.26 GHz**
- **Dual-core 64-bit processor**
- **32-bit 4HP system master (or stand-alone)**
- **For CompactPCI® 2.0 systems or CompactPCI® PlusIO 2.30 hybrid systems (2.0 and CPCI-S.0)**
- **Up to 4 GB DDR3 DRAM soldered**
- **CompactFlash® and microSD™ card slots**
- **Front I/O: VGA, 2 Gb Ethernet, 2 USB**
- **Rear I/O: 4 PCIe®, 4 USB, 4 SATA, 1 Gb Ethernet**
- **Other I/O (onboard, side card): SATA, SDVO, HD audio, USB, UART etc.**
- **Board controller**
- **-40 to +85°C screened version**
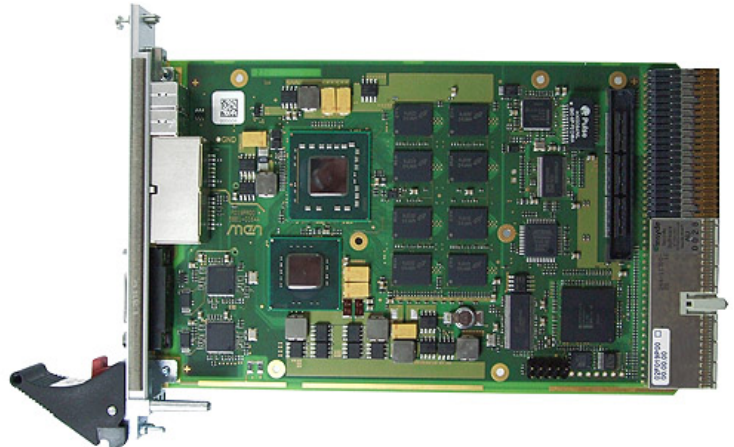
The F19P versatile 4HP/3U single-board computer is a continuation of MEN's proven range of Intel® CPU boards. It is equipped with the Intel® high-performance Core 2 Duo processor SP9300 running at 2.26 GHz and offering multi-core processor architecture from Intel® with full 64-bit support. The CPU card delivers an excellent graphics performance and is designed especially for embedded systems which require high computing performance with low power consumption. The F19P offers a 32-bit/33-MHz CompactPCI® bus interface and can also be used without a bus system. It offers 4 USB 2.0 and 4 fast (3Gb/s) SATA interfaces as well as 4 PCI Express® x1 links and one Gigabit Ethernet on the J2 rear I/O connector which is compatible with the PICMG 2.30 CompactPCI® PlusIO specification.
A total of seven PCI Express® lanes for high-speed communication (such as Gigabit Ethernet) are supported on the F19P. 3 x1 PCIe® links are used for the three onboard Ethernet interfaces. 4 x1 PCIe® links are available via rear I/O or on a specific side card. The F19P is equipped with a state-of-the-art fast DDR3 DRAM which is soldered to the F19P to guarantee optimum shock and vibration resistance. A robust CompactFlash® and microSD™ card device which are connected via a USB interface offer nearly unlimited space for user applications.

The standard I/O available at the front panel of F19P includes graphics on a VGA connector, two PCIe®-driven Gigabit Ethernet as well as two USB 2.0 ports.
The F19P can be extended by different side cards. Additional functions include two digital video interfaces for flat panel connection via DVI (multimedia), a variety of different UARTs or another four USBs, SATA for hard disk connection and HD audio.
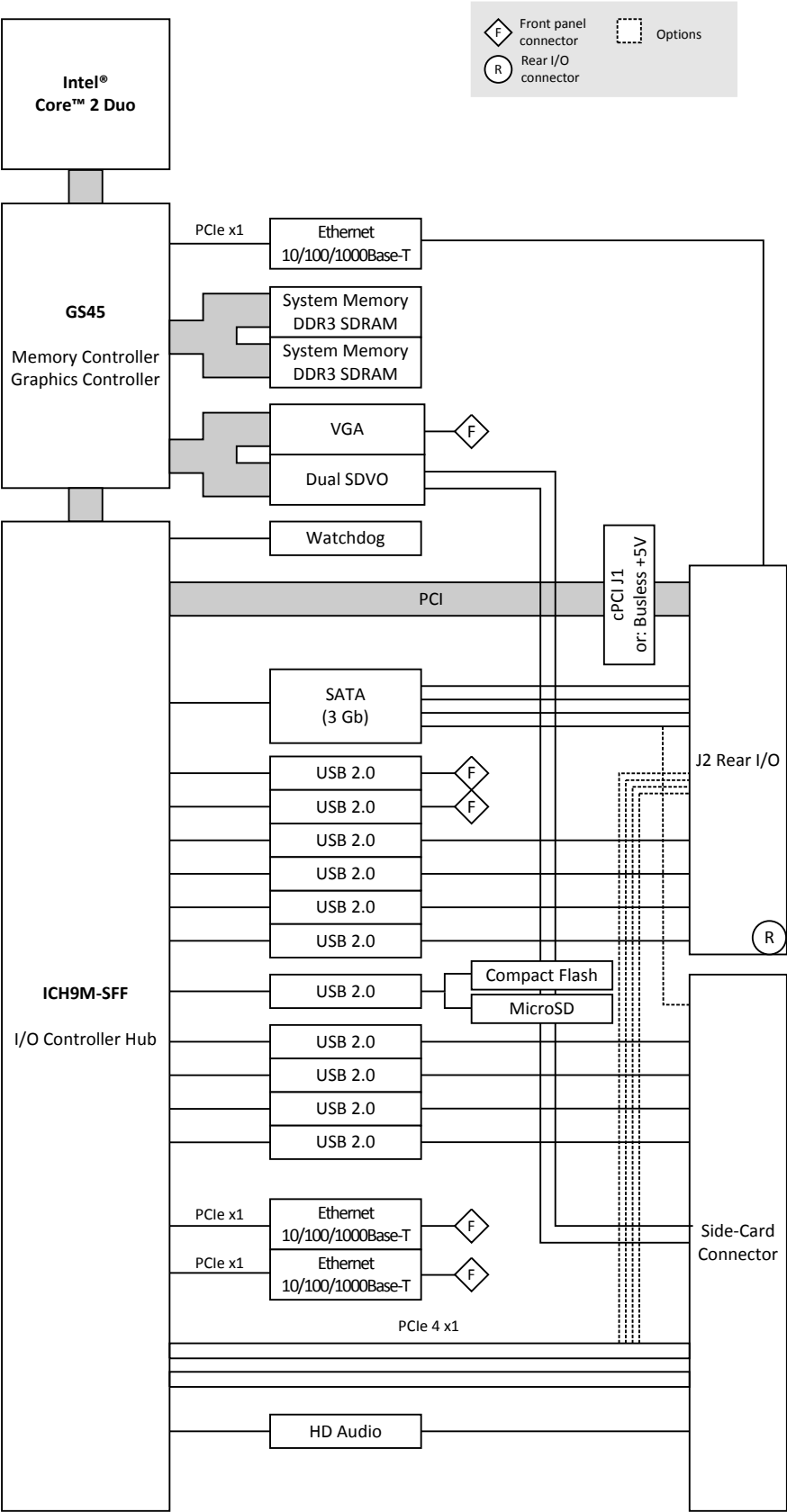Thermal supervision of the processor and a watchdog for the operating system complete the functionality of the F19P.
The F19P operates in Windows® and Linux environments as well as under real-time operating systems that support Intel®'s multi-core architecture. The InsydeH2O™ EFI BIOS was specially designed for embedded system applications.
Equipped with Intel® components exclusively from the Intel® Embedded Line, the F19P has a guaranteed minimum standard availability of 7 years.
The F19P is suited for a wide range of industrial applications, e.g. for monitoring, vision and control systems as well as test and measurement. The F19P comes with a tailored passive heat sink within 4 HP height.
The robust design of the F19P 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 F19P is also ready for coating so that it can be used in humid and dusty environments.

Diagram

Front panel connector

R Rear I/O connector

Options

Intel® Core™ 2 Duo

GS45

Memory Controller
Graphics Controller

PCIe x1 — Ethernet 10/100/1000Base-T

System Memory DDR3 SDRAM

System Memory DDR3 SDRAM

VGA — F

Dual SDVO

Watchdog

cPCI J1 or: Busless +5V

PCI

SATA (3 Gb)

USB 2.0 — F

USB 2.0 — F

USB 2.0

USB 2.0

USB 2.0

USB 2.0

ICH9M-SFF

I/O Controller Hub

USB 2.0 — Compact Flash / MicroSD

USB 2.0

USB 2.0

USB 2.0

USB 2.0

J2 Rear I/O

R

Side-Card Connector

PCIe x1 — Ethernet 10/100/1000Base-T — F

PCIe x1 — Ethernet 10/100/1000Base-T — F

PCIe 4 x1

HD Audio

Technical Data

CPU	■ Intel® Core™ 2 Duo SP9300 　□ Up to 2.26 GHz processor core frequency 　□ 1066 MHz system bus frequency ■ Chipset 　□ Northbridge: Intel® GS45 　□ Southbridge: Intel® ICH9M-SFF
Memory	■ Up to 6 MB L2 cache integrated in Core 2 Duo ■ Up to 4 GB DDR3 SDRAM system memory 　□ Soldered 　□ 800/1067 MHz memory bus frequency locked to the FSB frequency ■ 16 Mbits boot Flash ■ Serial EEPROM 2kbits for factory settings ■ CompactFlash® card interface 　□ Via USB 　□ Type I 　□ True IDE 　□ DMA support ■ MicroSD card interface 　□ Via USB
Mass Storage	■ CompactFlash® 　□ Connected via USB ■ MicroSD card 　□ Connected via USB ■ Serial ATA (SATA) 　□ Four channels via rear I/O, one channel via side-card connector (switchable) 　□ Transfer rates up to 3 Gbit/s 　□ RAID level 0/1 support
Graphics	■ Integrated in GS45 chipset 　□ Up to 533 MHz graphics core 　□ Maximum resolution: 2048 x 1536 pixels ■ 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 　□ Four USB 2.0 ports via rear I/O 　□ One USB for connection of CompactFlash®/MicroSD or USB NAND Flash 　□ UHCI implementation 　□ Data rates up to 480Mbit/s ■ Ethernet 　□ Two 10/100/1000Base-T Ethernet channels at the front 　□ RJ45 connectors at front panel 　□ Ethernet controllers are connected by two x1 PCIe® links from ICH9M 　□ Onboard LEDs to signal activity status and connection speed 　□ One 10/100/1000Base-T Ethernet channel via rear I/O 　□ Ethernet controller is connected by one x1 PCIe® link from GS45 ■ High Definition (HD) audio 　□ Accessible via side-card connector
Front Connections (Standard)	■ VGA ■ Two USB 2.0 (Series A) ■ Two Ethernet (RJ45)

Technical Data

Rear I/O	- Four SATA - Four USB - One Gigabit Ethernet - Four PCI Express® x1 links - Compatible with PICMG 2.30 CompactPCI® PlusIO 1PCI33/4PCIE2.5/4SATA3/4USB2/1ETH1G
Miscellaneous	- Board controller - Real-time clock, buffered by a GoldCap or alternatively a battery (5 years life cycle) - Watchdog timer - Temperature measurement - One user LED - Reset button
PCI Express®	- Three x1 links to connect local 1000Base-T Ethernet controllers - Data rate 250 MB/s in each direction (2.5 Gbit/s per lane) - Four x1 links for extension through side-card connector or rear I/O - Data rate up to 1 GB/s in each direction (2.5 Gbit/s per lane)
CompactPCI® Bus	- Compliance with 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)
Busless Operation	- Board can be supplied with +5 V only, all other voltages are generated on the board - Backplane connectors used only for power supply
Electrical Specifications	- Supply voltage/power consumption with Celeron® M722 processor: +5 V (-3%/+5%), 2.2 A typ., 2.7 A max. +3.3 V (-3%/+5%), 1.4 A (2 Gb Ethernet), 1 A (1 Gb Ethernet) +12 V (-10%/+10%), approx. 10 mA - If the board is supplied with 5 V only (typically without a bus connection), the 3.3 V are generated on the board and fed to the backplane (3 A max.) - Supply voltage/power consumption with SP9300 processor: +5 V (-3%/+5%), 4.9 A typ., 6.4 A max. +3.3 V (-3%/+5%), 1.4 A (2 Gb Ethernet), 1 A (1 Gb Ethernet) +12 V (-10%/+10%), approx. 10 mA - If the board is supplied with 5 V only (typically without a bus connection), the 3.3 V are generated on the board and fed to the backplane (3 A max.)
Mechanical Specifications	- Dimensions: conforming to CompactPCI® specification for 3U boards - Front panel: 4HP with ejector - Weight: 430 g
Environmental Specifications	- Temperature range (operation): - Depends on system configuration (CPU, hard disk, heat sink...) - Maximum: +85°C - Minimum: -40°C (all processors) - Conditions: airflow 1.5 m/s, typical power dissipation: 9.8 W (F19P version with Celeron® M722), 13.4 W (F19P version with SP9300 Core 2 Duo) with Windows® XP operating system and 1 Gb Ethernet connection - Temperature range (storage): -40..+85°C - Relative humidity (operation): max. 95% non-condensing - Relative humidity (storage): max. 95% non-condensing - Altitude: -300 m to +2,000 m - Shock: 50 m/s², 30 ms - Vibration (function): 1 m/s², 5 Hz - 150 Hz - Vibration (lifetime): 7.9 m/s², 5 Hz - 150 Hz - Conformal coating on request

Technical Data

MTBF	■ 552,030h @ 40°C according to IEC/TR 62380 (RDF2000)
Safety	■ PCB manufactured with a flammability rating of 94V-0 by UL recognized manufacturers
EMC	■ Tested according to EN 55022 (radio disturbance), IEC 61000-4-3 (electromagnetic field immunity), IEC 61000-4-4 (burst), IEC 61000-4-5 (surge) and IEC 61000-4-6 (conducted disturbances)
BIOS	■ InsydeH2O™ UEFI Framework

Software Support	■ Note that 64-bit hardware technology can be used in an optimal way with 64-bit operating system support
	■ Windows® (Windows® XP, Windows® 7)
	■ Linux
	  □ tested/verified with: Ubuntu 10.04 (kernel 2.6.32-21) 32-bit and 64-bit versions
	  □ OpenSuse 11.3 32-bit and 64-bit versions
	  □ and: CentOS 5.5 (kernel 2.6.18) 32-bit and 64-bit versions
	  □ Detailed matrix of supported interfaces under Ubuntu 10.04 and OpenSuse 11.3
	■ 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 Downloads.

Configuration & Options

Standard Configurations

Article No.	CPU Type	Clock	System RAM	Cflash/microSD	Side Card Slot	Operation Temperature
02F019P00	Celeron M 722	1.2 GHz	2 GB	0 MB	right	-40..+85°C
02F019P01	SP9300	2.26 GHz	4 GB	0 MB	right	0..+60°C

Options

CPU	■ Intel® SP9300, 2.26 GHz, 1066 MHz FSB, 6 MB cache, 25 W ■ Intel® SL9400, 1.86 GHz, 1066 MHz FSB, 6 MB cache, 17 W ■ Intel® SU9300, 1.2 GHz, 800 MHz FSB, 3 MB cache, 10 W ■ Intel® Celeron® M722, 1.2 GHz, 800 MHz FSB, 1 MB cache, 5.5 W ■ Intel® Celeron® M723, 1.2 GHz, 800 MHz FSB, 1 MB cache, 10 W
Memory	■ System RAM □ 2 GB or 4 GB ■ CompactFlash® □ 0 MB up to maximum available ■ MicroSD card □ 0 MB up to maximum available ■ NAND Flash instead of CompactFlash®, microSD™ card and battery □ 0 MB up to maximum available
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 □ Two M12 connectors with two 10/100/1000Base-T ports on 8HP instead of two RJ45 connectors
Mechanical	■ Side card can be added at left or right side of CPU ■ Adapter board for two M12 Ethernet connectors can be added at left or right side of CPU
Operation Temperature	■ Depends on system configuration (CPU, hard disk, heat sink...) ■ Maximum: +85°C ■ Minimum: -40°C (all processors)
Cooling Concept	■ Also available with conduction cooling in MEN CCA frame

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

Embedded Solutions
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Ordering Information

Standard F19P Models	**02F019P00**	Intel® Celeron® M 722, 1.2 GHz, 2 GB DDR3 DRAM, -40..+85°C screened
	02F019P01	Intel® Core™ 2 Duo SP9300, 2.26 GHz, 4 GB DDR3 DRAM, 0..+60°C
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
	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
	08CT12-00	CompactPCI® PlusIO rear transition module 3U/80mm, 2 Ethernet, 4 USB, 4 SATA, 4 PCIe® x1, -40°C..+85°C qualified
Memory	**0751-0042**	CompactFlash® card, 4 GB, Type I, fixed bit set, -40..+85°C
	0751-0046	MicroSD card, 2 GB, -40..+85°C
	0751-0052	MicroSD card, 4 GB, -40..+85°C
	0751-0055	CompactFlash® card, 8 GB, Type I, fixed bit set, -40..+85°C
	0751-0058	CompactFlash® card, 16 GB, Type I, fixed bit set, -40..+85°C
	0751-0061	CompactFlash® card, 2 GB, Type I, fixed bit set, -40 to +85°C
Systems & Card Cages		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.
	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® / 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
Miscellaneous Accessories	**0713-0003**	CompactPCI® 3U 1-slot backplane for stand-alone operation of F14, F15, F17, F18, F19P, F21P: 32-bit/33-MHz with rear I/O, 3.3V supply, ATX-power, power, JTAG, IPMB and utility connection, 6x screw connection M3
	08CT12-00	CompactPCI® PlusIO rear transition module 3U/80mm, 2 Ethernet, 4 USB, 4 SATA, 4 PCIe® x1, -40°C..+85°C qualified

Ordering Information

Software: Linux	This product is designed to work under Linux. See below for potentially available separate software packages from MEN.

13XM01-06	MDIS5™ low-level driver sources (MEN) for XM1, XM1L, MM1, MM2, XM2, F11S, F19P, F21P, F22P, G20, G22, SC21, SC27 and DC2 board controller
13Y001-06	MDIS5™ low-level driver sources (MEN) for LM63 on SMBus for F14, F15, F17, F18, F19P, D9, D601, A19 and A20
13Y004-06	MDIS5™ low-level driver sources (MEN) for generic SMBus driver for F14, F15, F17, F18, F19P, F21P, F22P, G20, G22, D9, D601, F600 and F601, A19, A20, F217, SC24, BC50M, BC50I and BL50W

Software: Windows®	This product is designed to work under Windows®. See below for potentially available separate software packages from MEN.

10F014-78	Windows® XP Embedded BSP (MEN) for F11S, F14, F15, F17, F18, F19P, F21P, G20, XM1, XM1L, XM2, MM1, MM2, SC21, SC24, DC1, DC2, RC1, BC50I, BC50M and BL50W
10Y000-78	Windows® Embedded Standard 7 BSP for F11S, F19P, F21P, F22P, G20, G22, XM1L, XM2, MM1, MM2, SC21, SC24, SC27, BC50M, BC50I, BL50W, BL50S, F206, F210, F215, F216, G215, P506, P507 and P511
13T003-70	Windows® chipset driver (Intel®) for F14, F15, F17, F18, F18E, F19P, F21P, F22P, G20, G22, XM2, D9, D6, D7, D601, A19 and A20
13T005-70	Windows® USB2UART driver (FTDI) for F14, F15, F17, F18, F19P, F21P, F22P, D9, A19, A20, XM2 and XM50 / XM51 / F50P / F50C hosts
13T006-70	Windows® HD Audio driver (Realtek) for F14, F15, F17, F18, F19P, F21P, F22P, D9 and A19
13T010-70	Windows® 32-bit network driver (Intel®) for XM1, XM1L, XM2, MM2, F11S, F18, F18E, F19P, F21P, F22P, G20, G22, GM1, GM2, G211, G211F, SC24, BC50I, BC50M and BL50W
13T019-70	Windows® graphics driver (Intel®) for XM2 and F19P
13T020-70	Windows® 64-bit network driver (Intel®) for F18, F18E, F19P, F21P, F22P, G20, G22, GM1, GM2, G211, G211F, XM2, SC24, BC50I, BC50M and BL50W
13XM02-77	Windows® Installset (MEN) for XM2 and F19P (Includes all free drivers developed by MEN for the supported hardware.)

Software: VxWorks®	This product is designed to work under VxWorks®. For details regarding supported/unsupported board functions please refer to the corresponding software data sheets.

10F019P60	VxWorks® 6.7 BSP (MEN) for F19P
10F019P61	VxWorks® 6.9 BSP (MEN) for F19P
13XM01-06	MDIS5™ low-level driver sources (MEN) for XM1, XM1L, MM1, MM2, XM2, F11S, F19P, F21P, F22P, G20, G22, SC21, SC27 and DC2 board controller
13Y001-06	MDIS5™ low-level driver sources (MEN) for LM63 on SMBus for F14, F15, F17, F18, F19P, D9, D601, A19 and A20
13Y004-06	MDIS5™ low-level driver sources (MEN) for generic SMBus driver for F14, F15, F17, F18, F19P, F21P, F22P, G20, G22, D9, D601, F600 and F601, A19, A20, F217, SC24, BC50M, BC50I and BL50W

Ordering Information

Software: QNX®	This product is designed to work under QNX®. For details regarding supported/unsupported board functions please refer to the corresponding software data sheets.

10F014-40	QNX® 6.3.0 installation support files (QNX® and MEN) for F14, F15, F17, F18, F19P, XM1, XM2 and MM1
10F019P40	QNX® 6.4.0 BSP (QNX® and MEN) for F19P and XM2
13XM01-06	MDIS5™ low-level driver sources (MEN) for XM1, XM1L, MM1, MM2, XM2, F11S, F19P, F21P, F22P, G20, G22, SC21, SC27 and DC2 board controller
13Y001-06	MDIS5™ low-level driver sources (MEN) for LM63 on SMBus for F14, F15, F17, F18, F19P, D9, D601, A19 and A20
13Y004-06	MDIS5™ low-level driver sources (MEN) for generic SMBus driver for F14, F15, F17, F18, F19P, F21P, F22P, G20, G22, D9, D601, F600 and F601, A19, A20, F217, SC24, BC50M, BC50I and BL50W

Software: Firmware/BIOS	This product includes a specially adapted BIOS.
14F019P01	System BIOS for F19P

Software: Miscellaneous	Intel® software development products such as analyzers, compilers, threading tools etc. can be downloaded under www.intel.com/cd/software/products/asmo-na/eng/index.htm. IA-32 Intel® Architecture Software Developer's Manuals are available under www.intel.com/products/processor/manuals/index.htm.

For operating systems not mentioned here contact MEN sales.

Documentation	Compare Chart 3U CompactPCI® Serial CPU and I/O cards » Download
	Compare Chart 3U CompactPCI® / PlusIO CPU cards » Download
	Compare Chart 3U CompactPCI® / PlusIO peripheral cards » Download
	Compare Chart 3U CompactPCI® / PlusIO extension cards » Download
20APPN004	Application Note: How to make a USB stick bootable
20F019PER	F19P Errata
20F019P00	F19P User Manual
21APPN015	Application Note: Using Real-Time Operating Systems on MEN CPUs with InsydeH2O™ UEFI BIOS
21APPN016	Application Note: Accessing SMBus under Linux Kernel 3.2 on MEN Intel® Boards

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