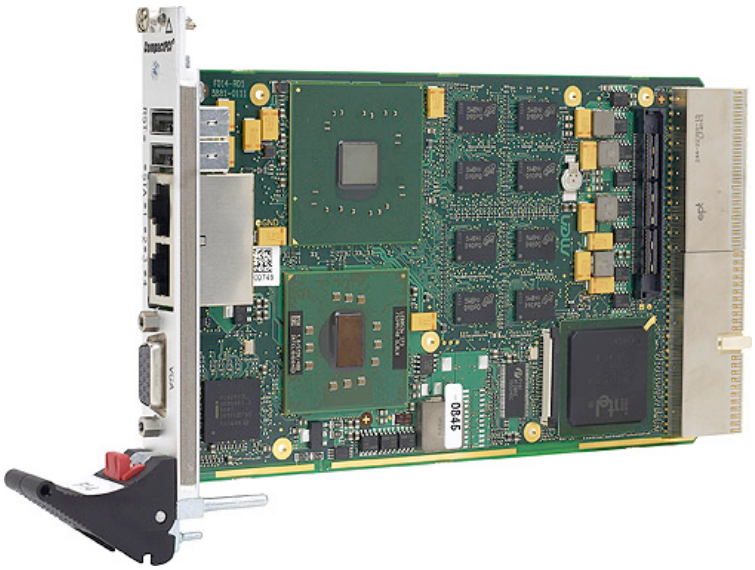
F18 – 3U CompactPCI®/Express Intel® Core™ 2 Duo CPU Board

- **Intel® Core™ 2 Duo T7500, 2.2 GHz**
- **Dual core 64-bit processor**
- **Full 64-bit support (4 GB memory addressable)**
- **PCI Express® six x1 links**
- **4 HP system master or stand-alone**
- **32-bit CompactPCI® or cPCI Express®**
- **Up to 4 GB DDR2 DRAM soldered**
- **CompactFlash® slot**
- **3 SATA interfaces**
- **Video via VGA and 2 SDVO**
- **2 Gigabit Ethernet (PCIe®)**
- **Up to 8 USB 2.0**
- **High Definition audio**
- **Board controller**



Equipped with the Intel® high-performance Core 2 Duo processor T7500 running at 2.2 GHz, the F18 is a versatile 4HP/3U (single-slot, single-size Eurocard) single-board computer based on the latest 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 F18 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 F18. 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 is soldered to F18 to guarantee optimum shock and vibration resistance. A robust IDE CompactFlash® device offers nearly unlimited space for user applications. In addition to parallel ATA, three serial ATA lines are available.

The standard I/O available at the front panel of F18 includes VGA graphics, two PCIe®-driven Gigabit Ethernet interfaces as well as two USB 2.0 ports.

The F18 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 USB 2.0 ports, SATA for hard disk or RAID connection and HD audio.The F18 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 F18.

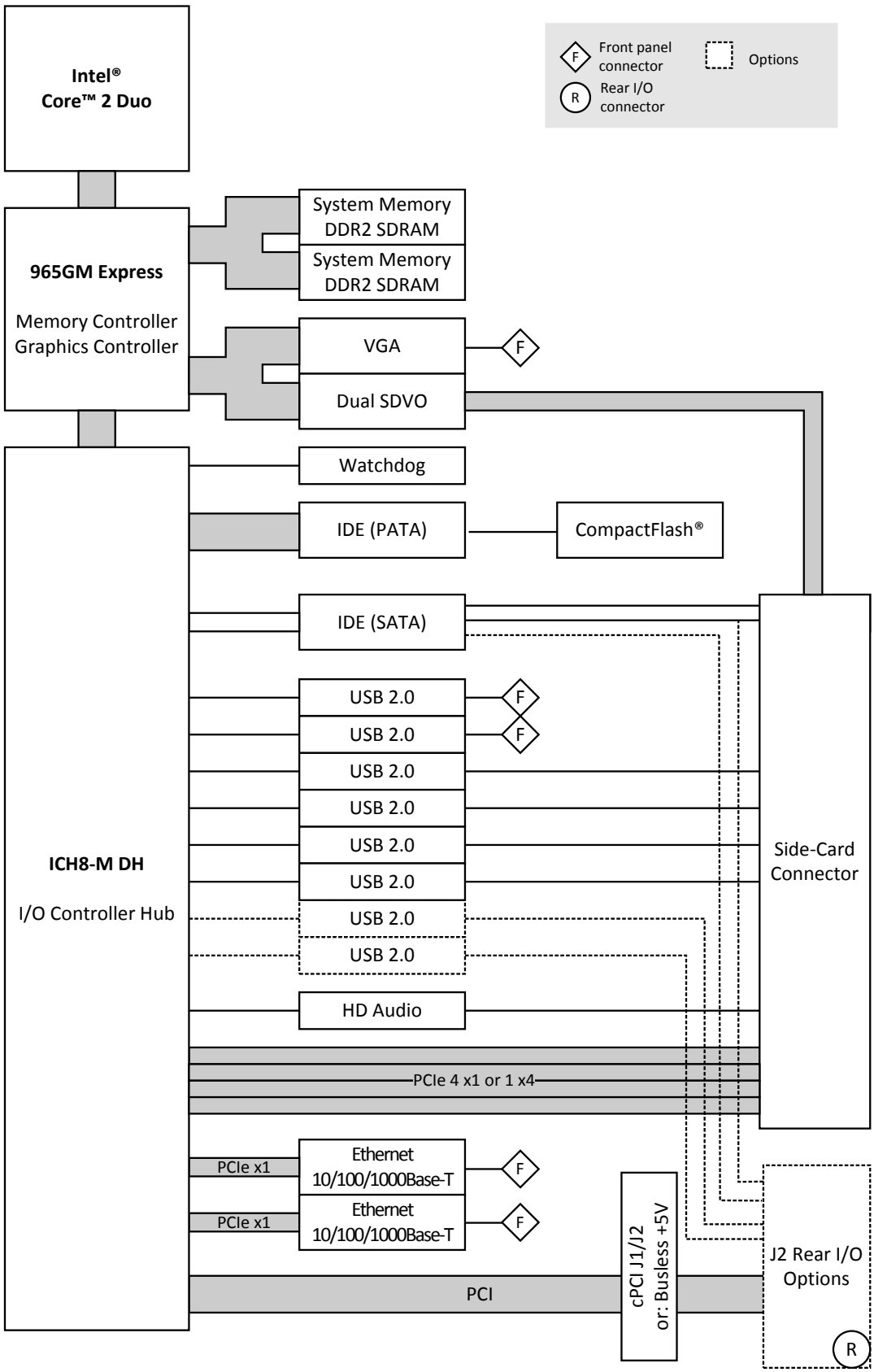
The F18 operates in Windows® and Linux environments as well as under real-time operating systems that support Intel®'s multi-core architecture. The Award BIOS was specially designed for embedded system applications.

Equipped with Intel® components exclusively from the Intel® Embedded Line, the F18 has a guaranteed minimum standard availability of 5 years.

The F18 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 F18 comes with a tailored passive heat sink within 4 HP height. The robust design of the F18 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 F18 is also ready for coating so that it can be used in humid and dusty environments.

Diagram


Front panel connector
Options
Rear I/O connector
Intel® Core™ 2 Duo
965GM Express
Memory Controller
Graphics Controller
System Memory DDR2 SDRAM
System Memory DDR2 SDRAM
VGA
Dual SDVO
Watchdog
IDE (PATA)
CompactFlash®
IDE (SATA)
USB 2.0
USB 2.0
USB 2.0
USB 2.0
USB 2.0
USB 2.0
USB 2.0
USB 2.0
HD Audio
ICH8-M DH
I/O Controller Hub
Side-Card Connector
PCIe 4 x1 or 1 x4
PCIe x1
Ethernet 10/100/1000Base-T
PCIe x1
Ethernet 10/100/1000Base-T
PCI
cPCI J1/J2
or: Busless +5V
J2 Rear I/O Options

Technical Data

CPU	■ Intel® Core™ 2 Duo T7500 □ Dual-core 64-bit processor □ 2.2GHz processor core frequency □ Up to 800MHz front-side bus frequency ■ Chipset □ Northbridge: Intel® 965GME Express □ Southbridge: Intel® ICH8M-E (Enhanced)
Memory	■ 4MB L2 cache integrated in Core 2 Duo ■ 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, up to two channels via rear I/O (optional) □ Transfer rates up to 150MB/s □ RAID level 0/1 support
Graphics	■ Integrated in 965GME Express chipset □ Up to 500MHz 256-bit graphics core □ Maximum resolution: 2048 x 1536 pixels @ 60Hz, 32bpp reduced blanking timing (driver limited) ■ 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 480Mbit/s ■ Ethernet □ Two 10/100/1000Base-T Ethernet channels □ RJ45 connectors at front panel □ Ethernet controllers are connected by two 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)

Technical Data

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®	■ Two x1 links to connect local 1000Base-T Ethernet controllers □ Data rate 250MB/s in each direction (2.5 Gbit/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 Gbit/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%), 9A typ. □ +3.3V (-3%/+5%), 1.8A (2 Gb Ethernet), 1.3A (1 Gb Ethernet) □ +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.) No external 3.3 V voltage may be applied in that case! ■ MTBF: 238,053h @ 40°C according to IEC/TR 62380 (RDF2000)
Mechanical Specifications	■ Dimensions: conforming to CompactPCI® specification for 3U boards ■ Front panel: 4HP with ejector ■ Weight: 420g
Environmental Specifications	■ Temperature range (operation): □ 2.2GHz Core 2 Duo T7500: 0..+60°C □ Conditions: airflow 1.5m/s, typical power dissipation 38W, 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 + 2,000m ■ Shock: 15g/11ms ■ Bump: 10g/16ms ■ Vibration (sinusoidal): 1g/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), IEC61000-4-2 (ESD) and IEC61000-4-4 (burst)
BIOS	■ Award BIOS
Software Support	■ Note that 64-bit hardware technology requires 64-bit operating system support ■ Windows® (including Vista) ■ 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 Downloads.

Configuration & Options

Standard Configurations

Article No.	CPU Type	Clock	System RAM	CFlash	Side Card Slot	Operation Temperature
02F018-00	T7500	2.2 GHz	4 GB	0 MB	right	0..+60°C

Options

CPU	■ Core 2 Duo T7500, 2.2GHz (35W) ■ Core 2 Duo L7500 1.6 GHz (17W) ■ Core 2 Duo U7500 1.06GHz (10W)
Memory	■ System RAM □ 256 MB, 512 MB, 1 GB, 2 GB or 4 GB ■ CompactFlash® □ 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 instead of two RJ45 connectors on 8HP
Rear I/O	■ Two SATA channels (third SATA channel via side-card connector) ■ Two USB 2.0 ports
Mechanical	■ Side card can be added at left or right side of CPU
Operation Temperature	■ Depends on system configuration (CPU, hard disk, heat sink...) ■ Maximum: +60°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.

Ordering Information

Standard F18 Models	**02F018-00**	Intel® Core™ 2 Duo T7500, 2.2 GHz, 4 GB DDR2 DRAM, 2 Gigabit Ethernet, 0..+60°C
	02F018-03	Intel® Core™ 2 Duo T7500, 2.2 GHz, 2 GB DDR2 DRAM, 2 Gigabit Ethernet, 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
	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	**0751-0042**	CompactFlash® card, 4 GB, Type I, fixed bit set, -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

Ordering Information

Software: Linux

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

13Y001-06	MDIS5™ low-level driver sources (MEN) for LM63 on SMBus for F14, F15, F17, F18, F19P, 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, F19P, F21P, F22P, G20, G22, D9, D601, F600 and F601, A19, A20, F217, SC24, BC50M, BC50I and BL50W
13Y007-06	MDIS5™ low-level driver sources (MEN) for F14, F15, F17, F18, D9, D601, A19 and A20 board controller

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
13F014-77	Windows® Installset (MEN) for F14, F15, F17, F18, D9, D601, A19 and A20 (Includes all free drivers developed by MEN for the supported hardware.)
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, 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
13T008-70	Windows® chipset graphics driver (Intel®) for F18
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
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

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
	13Y001-06	MDIS5™ low-level driver sources (MEN) for LM63 on SMBus for F14, F15, F17, F18, F19P, 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, F19P, F21P, F22P, G20, G22, D9, D601, F600 and F601, A19, A20, F217, SC24, BC50M, BC50I and BL50W
	13Y007-06	MDIS5™ low-level driver sources (MEN) for F14, F15, F17, F18, D9, D601, A19 and A20 board controller
Software: Firmware/BIOS	This product includes a specially adapted BIOS.	
	14F018-00	System BIOS for F18
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® / 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
	20F018-00	F18 User Manual
	21APPN016	Application Note: Accessing SMBus under Linux Kernel 3.2 on MEN Intel® Boards

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