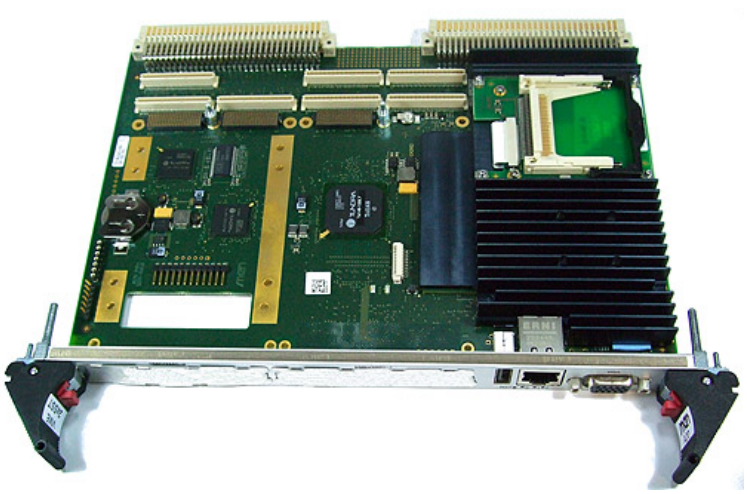
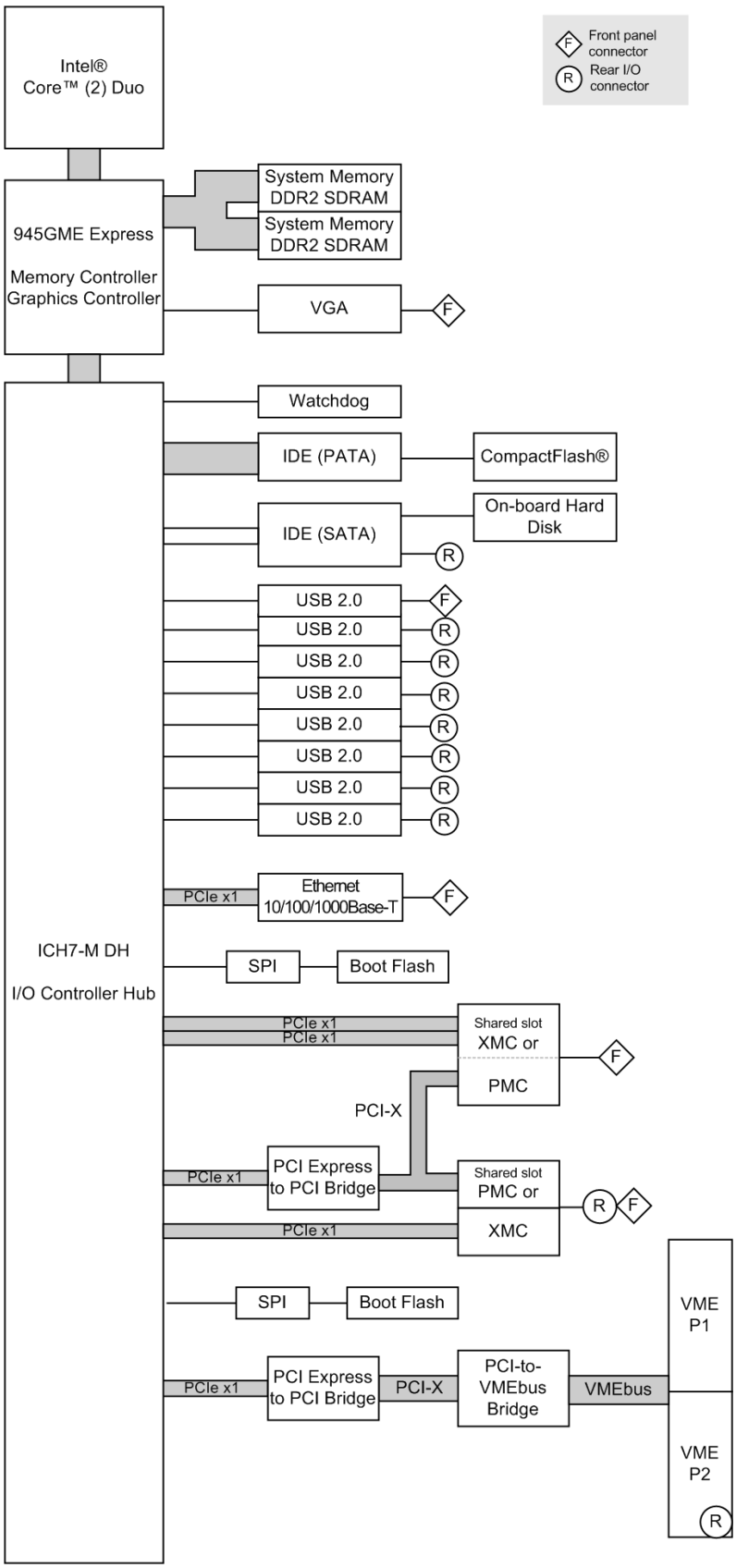
A20 – 6U VMEbus 2eSST Intel® Core™ 2 Duo CPU Board

- **Intel® Core™ 2 Duo L7400**
- **Core Duo U2500 or L2400**
- **1-slot 2eSST VMEbus master and slave**
- **Up to 4 GB DDR2 DRAM soldered**
- **2 SATA, 1 PATA interface**
- **1 VGA at front**
- **1 Gb Ethernet at front**
- **1 USB at front**
- **2 XMC or 2 PMC**
- **PCI Express® six x1 links**
- **Board controller**



The A20 6U single-slot VMEbus SBC supports a variety of Intel® Core™ Duo and Core 2 Duo processors from the high-end 1.5 GHz L7400 to the low-voltage dual-core versions down to a selection of single-core Celeron® M types. It is designed especially for systems which require high computing and graphics performance and low power consumption in a typical Windows® environment, under VxWorks® or Linux.
Using the TSI148 bridge controller the CPU card provides 2eSST performance levels while maintaining backwards compatibility with older standards such as VME64 and VME32.
The standard I/O available at the front panel of the A20 includes graphics on a VGA connector, one Gigabit Ethernet and one USB 2.0 interface. As an option a COM interface on an RJ45 connector can be provided instead of the USB interface.
As rear I/O the A20 provides seven USB interfaces, one SATA port and PMC rear I/O.
A second SATA interface for connection of an onboard hard disk or for building up RAID systems is provided on-board instead of one PMC or XMC. One PATA interface supports the onboard CompactFlash® slot.
The working memory comprises up to 4 GB DDR2 DRAM which is soldered to guarantee optimum shock and vibration resistance.
A total of six PCI Express® lanes for high-speed communication (such as Gb Ethernet) are supported on the A20. One x1 PCIe® link is used for the onboard Ethernet interface, three x1 links support the XMC slots, one x1 link supports the PMC slots via a PCI Express® to PCI-X bridge and one x1 link is used for connection of the VMEbus bridge. The PMC slots support 64bit/66MHz (PCI-X).
Supervision of the processor and board temperature as well as a watchdog for monitoring the operating system complete the functionality of the SBC.
The A20 comes with a tailored passive heat sink within 4 HP height. However, forced air cooling is always required inside the system.
Equipped with Intel® components exclusively from the Intel® Embedded Line, the A20 has a guaranteed minimum standard availability of 5 years.
Its robust design make the A20 especially suited for rugged environments with regard to extended operating temperature, shock and vibration according to applicable DIN, EN or IEC industry standards. It is also ready for coating for use in humid and dusty environments. The wide range of industrial applications include for example monitoring, vision and control systems as well as test and measurement. Main target markets comprise industrial automation, security and infotainment, traffic and transportation, shipbuilding, medical engineering and robotics.

Diagram


Front panel connector
Rear I/O connector
Intel® Core™ (2) Duo
945GME Express
Memory Controller
Graphics Controller
System Memory DDR2 SDRAM
System Memory DDR2 SDRAM
VGA
ICH7-M DH
I/O Controller Hub
Watchdog
IDE (PATA)
CompactFlash®
IDE (SATA)
On-board Hard Disk
USB 2.0
USB 2.0
USB 2.0
USB 2.0
USB 2.0
USB 2.0
USB 2.0
USB 2.0
PCIe x1
Ethernet 10/100/1000Base-T
SPI
Boot Flash
PCIe x1
PCIe x1
Shared slot XMC or PMC
PCI-X
PCIe x1
PCI Express to PCI Bridge
Shared slot PMC or XMC
PCIe x1
SPI
Boot Flash
PCIe x1
PCI Express to PCI Bridge
PCI-X
PCI-to-VMEbus Bridge
VMEbus
VME P1
VME P2

Technical Data

CPU	■ Up to Intel® Core™ 2 Duo L7400 □ Dual-core 64-bit processor □ Up to 1.5GHz processor core frequency □ Up to 667MHz front-side bus frequency ■ Chipset □ Northbridge: Intel® 945GME Express □ Southbridge: Intel® ICH7-M DH
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 ■ CompactFlash® card interface □ Via onboard IDE □ Type I □ True IDE □ DMA support ■ 8Mbits boot Flash ■ Serial EEPROM 2kbits for factory settings
Mass Storage	■ Parallel IDE (PATA) □ One IDE port for local CompactFlash® ■ Serial ATA (SATA) □ One channel for onboard hard disk □ One channel via rear I/O connector P2 □ Transfer rates up to 150MB/s □ RAID level 0/1 support
Graphics	■ Integrated in 945GME Express chipset □ 200/250MHz 256-bit graphics core ■ VGA connector at front panel
I/O	■ USB □ One USB 2.0 port via Series A connector at front panel □ Seven USB 2.0 ports via rear I/O □ UHCI implementation □ Data rates up to 480Mbit/s ■ Ethernet □ One 10/100/1000Base-T Ethernet channel at front panel □ RJ45 connector at front panel □ Ethernet controller connected by one x1 PCIe® link □ Onboard LEDs to signal activity status and connection speed
Front Connections	■ VGA ■ One USB 2.0 (Series A) ■ One Ethernet (RJ45)
Rear I/O	■ USB 2.0, seven ports ■ PMC rear I/O (for one PMC) ■ One SATA channel

Technical Data

Mezzanine Slot	■ Two slots usable for PMC or XMC ■ XMC slots □ Compliant with XMC standard VITA 42.3-2006 □ Two x1 PCI Express® links for slot 2 □ One x1 PCI Express® link for slot 1 ■ PMC slots □ Compliant with PMC standard IEEE 1386.1 □ PCI / PCI-X 32/64 bit, 33/66MHz, 3.3V V(I/O) □ One x1 PCI Express® link via PCI Express® to PCI-X bridge □ PMC I/O module (PIM) support (for one PMC) □ Current limited to 2A for 5V and 3.3V
Miscellaneous	■ Board controller ■ Real-time clock, buffered by a GoldCap and a battery ■ Watchdog timer ■ Temperature measurement ■ One user LED ■ Reset button
PCI Express®	■ One x1 link to connect local 1000Base-T Ethernet controller ■ Three x1 links to connect XMC ■ One x1 link to connect PMC via PCI Express® to PCI-X bridge ■ One x1 link to connect the VME bridge via a PCI Express® to PCI-X bridge ■ Data rate up to 250MB/s in each direction (2.5 Gbit/s per lane)
VMEbus	■ IDT TSI148 controller ■ Compliant with VME64 Specification ■ Supports VME32, VME64, 2eVME and 2eSST (VITA 1.5) ■ Maximum data rate 250 MB/s (limited by PCI Express® link) ■ Slot-1 function with auto-detection ■ Master □ D08:D16:D32:D64:A16:A24:A32:A64:BLT:MBLT:RMW ■ Slave □ D08:D16:D32:D64:A16:A24:A32:A64:BLT:MBLT ■ DMA ■ Mailbox functionality ■ Bus timer ■ Location Monitor ■ Interrupter D08(O):I(7-1):ROAK ■ Interrupt handler D08(O):IH(7-1) ■ Single level 3 fair requester ■ Single level 3 arbiter
Electrical Specifications	■ Supply voltage/power consumption: □ +5V (-3%/+5%), 3.2A (idle)..6.6A (full load) □ 3.3V for XMC/PMC are generated on the board
Mechanical Specifications	■ Dimensions: standard double Eurocard, 233.3mm x 160mm ■ Front panel: 4HP with ejector ■ Weight: □ Without XMC/PMCs: 525g

Technical Data

Environmental Specifications	■ Temperature range (operation): □ 0..+60°C □ Airflow: min. 1.5m/s ■ 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 (EN 60068-2-27) ■ Bump: 10g/16ms (EN 60068-2-29) ■ Vibration (sinusoidal): 1g/ 10..150Hz (EN 60068-2-6) ■ Conformal coating on request
MTBF	■ 190,571h @ 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 Class A (radio disturbance), EN 61000-4-2 (ESD), EN 61000-4-4 (burst) and EN 61000-4-5 (surge)
BIOS	■ Award BIOS
Software Support	■ Windows® ■ Linux ■ VxWorks® ■ 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	System RAM	XMC/PMC	P0 Ethernet	Operation Temp.
01A020-00	L7400	2 GB DDR2	2 slots	No	0..+60°C

Options

CPU	■ Core 2 Duo L7400, 1.5GHz LV ■ Core Duo L2400, 1.66GHz LV ■ Core Duo U2500, 1.2GHz ULV ■ Celeron® M 423, 1.06 GHz
Memory	■ System RAM □ 512 MB, 1 GB, 2 GB or 4 GB ■ CompactFlash® □ 0 MB up to maximum available
I/O	■ UART (instead of front USB and one PCI Express® link) □ One RS232 via adapter cable (see Accessories) □ One RJ45 connector at front panel □ Data rates 300bit/s..230kbit/s □ FIFO receive and transmit buffers for high data throughput □ Handshake lines: full support

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 A20 Models	**01A020-00**	Intel® Core™ 2 Duo L7400, 1.5 GHz, 2 GB DDR2 DRAM, P0 not mounted, 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
Miscellaneous Accessories	**05F006-00**	RS232 interface cable RJ45 to 9-pin D-Sub (1 COM to 1 COM), 2m
	05P000-01	25 mounting screw sets to fix PMC/XMC modules on carrier boards
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
	13Z014-90	Linux device driver (MEN) for PCI-to-VME bridge on A12, A13, A14, A15, A17, A19, A20, A21B/A21C and B11
Software: Windows®	This product is designed to work under Windows®. See below for potentially available separate software packages from MEN.	
	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
	13T007-70	Windows® chipset graphics driver (Intel®) for F15, F17, D9, A19 and A20
	13Z014-71	VME4WIN/MDIS5™ Software Package (MEN) - VMEbus support under Windows® XP/ Vista/Windows® 7 for MEN A19 and A20

Ordering Information

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.	
	10A019-60	VxWorks® 6.6 BSP for A19 and A20
	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.	
	14A020-00	System BIOS for A19 and A20
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 6U VMEbus CPU and I/O cards » Download	
	20A020-ER	A20 Errata
	20A020-00	A20 User Manual
	21APPN016	Application Note: Accessing SMBus under Linux Kernel 3.2 on MEN Intel® Boards

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