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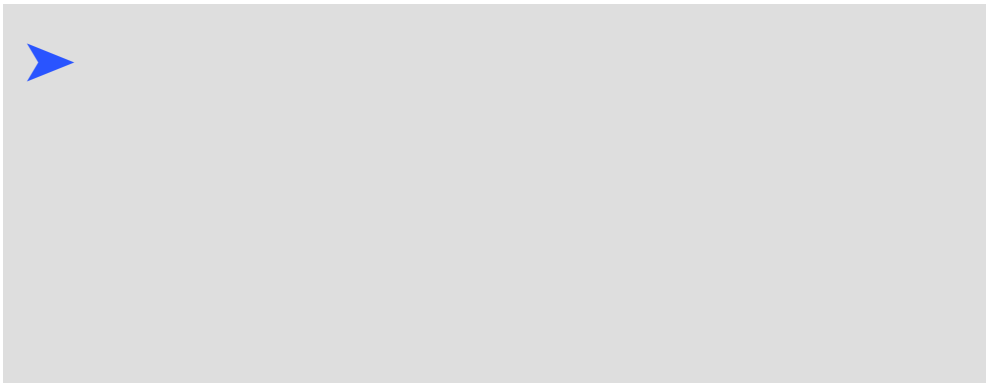
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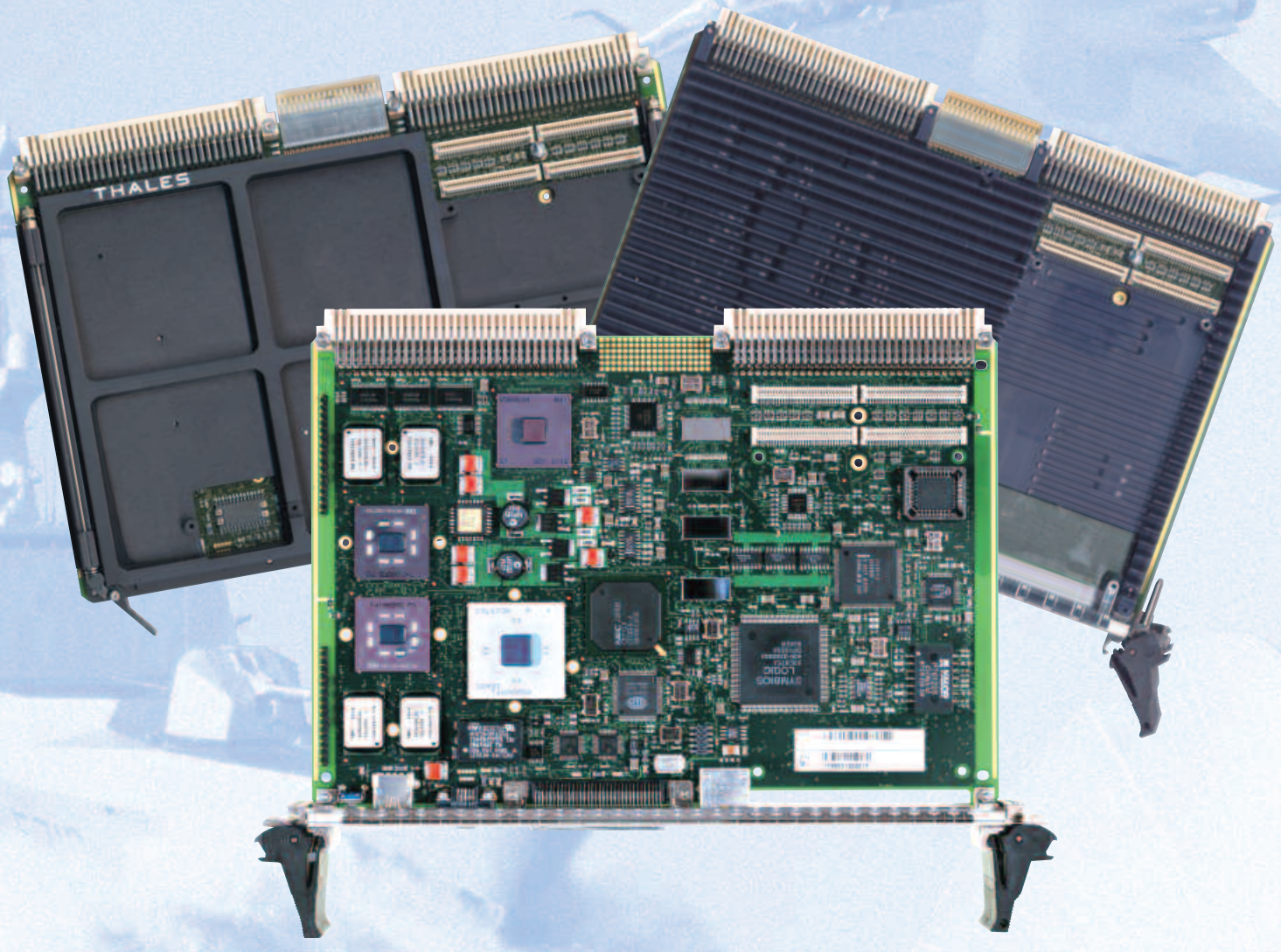


Since March 6th, 2008 Thales Computers has become Kontron Modular Computers S.A.

This datasheet was created with Thales graphics rules.
The Kontron Corporate Design will be implemented in the next version of this document.
Each occurence of "Thales Computers" shall be understood as "Kontron Modular Computers S.A."

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PowerEngine VMPC6a & VMPC6a-Dual

Available in all the 5 environmental ruggedization levels, from air-cooled commercial grade to conduction-cooled one, and available in both single and dual PowerPC 750 processor configuration, the Thales Computers VMPC6a & VMPC6a-Dual represents the top notch Single Board Computers (SBC) for embedded, military and aerospace applications.

THALES

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General Overview

At Thales Computers, we have a whole-system philosophy when it comes to innovation. We actively pursue and develop techniques for improving our product performance, I/O capabilities, cluster management and ruggedness to give our customers maximum design flexibility with cutting-edge technology. The PowerEngine6 series represents another step forward in Thales Computers' technological progress. As the PowerPC® experts, we continue to track the evolution of PowerPC technology and offer our customers extensive COTS design experience. Of course, the Power-Engine6 series is available with The Ruggedizer™, our patented convection and conduction-cooled heatsink solution for harsh environments.

ASIC Innovation

To offer the best board-level solutions, Thales Computers teamed with IBM to develop the key chips of the PowerEngine6 architecture and to take advantage of IBM technology for low power consumption.

AVIGNON, the host bridge, benefits of the cumulated experience of both partners since the beginning of the PowerPC and brings new features and performances adapted to the PowerPC 750 and 74XO (G4) versions: double-bank SDRAM memory with ECC, support of dual processor with 100 and 133 MHz PowerPC bus, management of two PCI busses: one 32-bit PCI bus for I/O management and a second 64-bit PCI bus at up to 66 MHz.

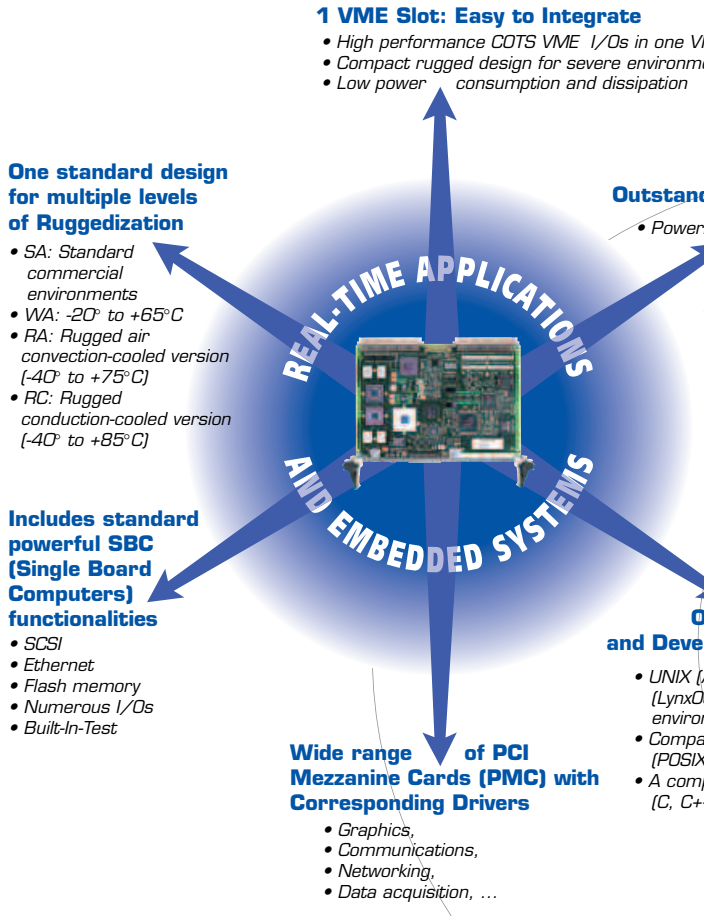
ALMA64 is the PCI/VME bus bridge that interfaces the 32-bit PCI bus of AVIGNON with the VME64 bus. Due to its very little die size, ALMA64 overbeats the competition for low power designs.

COBRA is dedicated to the control of interrupts and other real-time functions. Interrupt control features an OpenPIC compliant device including microprocessor support, support for all variation of edge/level high/low polarity on 32 interrupt sources. With numerous timers, control of NVRAM and Flash Memory, FIFOs for message passing, ..., COBRA eases the development of real-time application and the control of complex I/Os.

Designed for Harsh Environments

Thales Computers' SBC products respond to a diverse range of ruggedization requirements in embedded applications. Available in several different configurations representing multiple levels of ruggedization, the boards can be tailored to any application's needs. Ruggedization occurs early in the SBC's design phase following Thales Computers' stringent selection of components, strict design and layout rules, intense simulation tests and an established high-quality manufacturing process.

The PowerEngine6 SBC designed-in ruggedization is then augmented with The Ruggedizer, a patented heat-drain technology from Thales. The PowerEngine6 family is available with four levels of ruggedization: "standard" (SA) for commercial applications, "extended" (WA) for higher climatic and humidity constraints, and two Ruggedizer equipped models : the rugged air-cooled version (RA) and the rugged convection-cooled version (RC) for harsh conditions such as shock, vibration and humidity. After years of providing harsh environment solutions, Thales Computers' ruggedized PowerEngine6 family is uniquely positioned to provide a wide range of products for the industrial, military and aerospace environments.



The Products: VMPC6a & VMPC6a-Dual

The PowerEngine6 is available in both single and dual processor configurations for performance and design flexibility. With over 21 SPECint95 and over 13 SPECfp95 per processor, the VMPC6a & VMPC6a-Dual are extremely high performance engines in a single VME slot. To further boost performance, each processor has a dedicated 1MB of backside L2 cache, allowing both PowerPC 750 microprocessors to run in parallel while using only about five watts of power. The use of a separate L2 cache bus enables up to three times faster processing than earlier cache designs.

VMPC6a & VMPC6a-Dual

Thales Computers' VMPC6a SBCs are designed to support the high performance and low power consumption IBM's PowerPC 750.

The VMPC6a and VMPC6a-Dual, as specified below, have an on-board single or dual PowerPC 750 processor featuring speeds of 450 MHz.

Technical Data

PowerPC Processor

- Either one or two superscalar PowerPC 750 processors operating at 450 MHz
- SPECint95: 21+
- SPECfp95: 13+
- 32 KB instruction cache and 32 KB data cache
- Four instructions per clock cycle
- Dynamic branch prediction
- Multiple integer units
- Memory Management Unit (MMU)
- 64-bit data bus
- Fully JTAG compliant
- RISCWATCH functionality (SA and WA build levels)
- Low Power Implementation

Ethernet Interface

- Onboard PCnet-PCI Ethernet controller: 10/100BASE-T on front panel or P2 (build option on P2 for SA, WA and RA build levels products, standard on RC)
- ANSI 802.3 compliant
- Managed by INTEL's 21143 chip

SCSI Interface

This interface enables easy connection with industry-standard mass storage devices (i.e. hard disk, CD-ROM, streamer, etc.).

- Managed by the SYM53C875A PCI-SCSI I/O processor (SIOP)
- Wide Ultra SCSI bus transfers in single-ended mode (40 MB/s)

Serial Lines

- Two available EIA-232 ports
- Handled by TL16C550C components
- INS8250N-B, PC16550A, PC16450 software compatible

ALMA64 VME Interface

- Managed by the ALMA 64/IBM PCI-to-VME bridge component, a highly integrated low-power, single-chip solution
- VME64 ANSI/VITA 1-1994 compliant
- VMEbus system controller
- VMEbus requester (Level 1-4)
- VMEbus interrupter and interrupt handler (IRQ1-7)
- VMEbus master/slave A32, A24, A16:D32, D16, D8, UAT
- VMEbus master/slave A32, A24: D32BLT, D64MBLT
- Programmable VME slave image base address and size (8 VME slave channels)
- PCI to VME access conversion through 8 MB granularity mapping table
- Transmit/Receive FIFOs
- Programmable posted write, prefetch read, coupled mode
- Programmable BB2BLT mode: mapping of multiple single PCI accesses to a VMEbus BLT/MBLT cycle
- Semaphore registers
- VME/PCI 2 channels DMA controller

Keyboard / Mouse

- Keyboard and mouse interface

SDRAM Memory

- 64, 128, 256, or 512 MB of onboard SDRAM with ECC
- Double bank memory management handled by the AVIGNON CPC710 host bridge

Cache Memory

2 MB cache memory per processor is implemented (high performance transfers due to dedicated L2 Bus) running at high speed (clock ratio 1:2).

ROM Memory

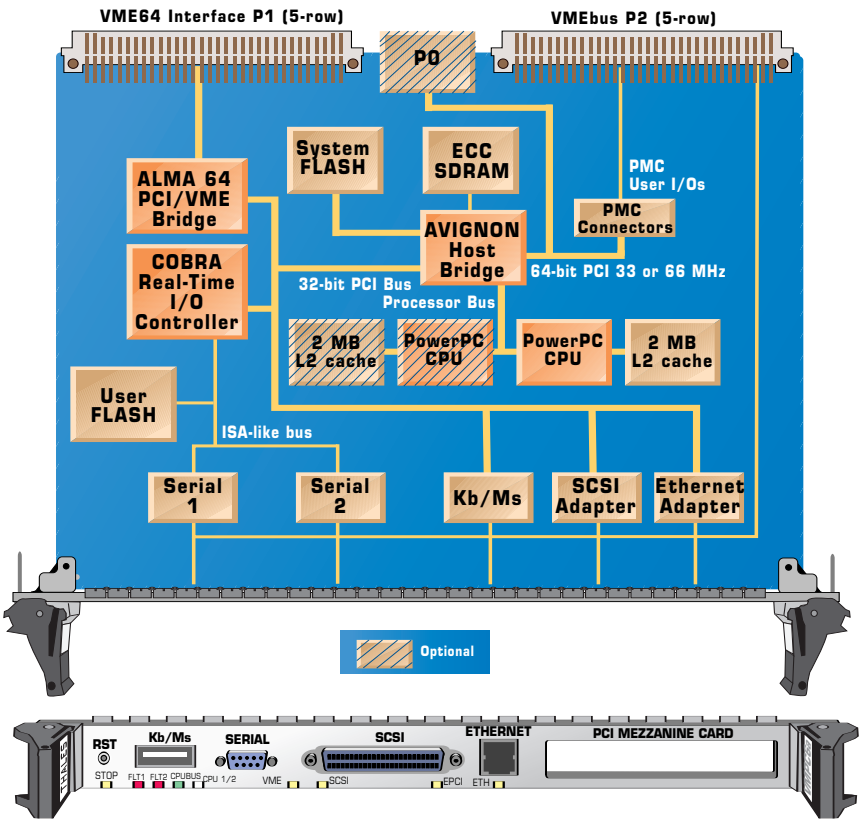
512 KB + 1 MB of system Flash EPROM memory are available for initialization and operating system boot routines.

Additional User Flash (up to 32 MB) are devoted to embedded system requirements.

NVRAM/RTC

An 8 KB NVRAM chip provides convenient non-volatile storage for board parameters. MT48T18 (SA class) or MT48T59 (RA and RC classes) provide real-time clock and time of day with battery-backed storage.

This NVRAM/RTC feature is standard on SA class products and optional on RA and RC class products.



PCI Interface

Two PCI interfaces (master/slave with burst capability) are implemented on the PowerEngine6:

- The internal interface provides a high-speed backbone for local interconnect of on-board devices (Host Bridge, Ethernet, SCSI, keyboard and mouse, ...) and is fully compliant to PCI Specs- Rev.2.0 (32-bit).
- The external PCI interface is a user PCI interface designed for connecting one IEEE standard PCI Mezzanine Cards (PMC). It provides a Rev. 2.0 standard 64-bit PCI interface that can operate at 33 or 66 MHz. Connecting a PMC to a host increases performance and functionality at low cost.

The signaling level of the PCI bus can be either 5V or 3.3V. It is fixed at the manufacturing stage according to the order code. Please check that the PCI signaling level of all the interconnected devices, i.e. the VMPC6a, the foreseen PMC and the PMC carrier, match. Both the PowerEngine6 single and dual SBC can maintain concurrent bus operations on two PCI buses using a uniquely optimized host bridge. This allows applications using PCIs to operate efficiently in parallel, doubling available throughput.

PMC Carrier Card

Thales Computers offers 2 PMC carriers that expand the mother-board PCI bus to extra PMC slots:

- ***ICPMC6:*** brings 2 extra PCI 64 expansion slots to the VMPC6a making the assembly VMPC6+ICPMC6 able to host 3 PMCs while occupying 2 VME slots. The ICPMC6 is not available in a rugged conduction-cooled version.
- ***V2PMC:*** available in all the environment classes, it expands the PCI bus of the VMPC6 to an extra PMC via the PO. The usable PCI bus is limited to PCI 32/33 MHz.

The following table summarizes the number of PMC slots available with and without the carrier board:

Configuration	PMC Slots	VME Slots	Availability
VMPC6a without Carrier Card	1	1	SA, WA, RA, RC
VMPC6a with ICPMC6	3	2	SA, WA
VMPC6a with V2PMC	3	2	SA, WA, RA, RC

For the Rugged versions (RC and RA), the PMC slot can accept conduction-cooled PMCs according to CCPMC VITA-20 standard.

Thales Computers Dedicated Real-Time I/O Controller: COBRA

The COBRA chip brings a highly-integrated single chip solution to control interrupts by providing up to 32 I/O device interrupts inputs and 4 interprocessor interrupts.

Thales Computers' COBRA technology is also optimized for real-time applications and offers:

- Connection to PCI bus Rev. 2.0 (slave mode)
- ISA-like interface for serial ports, RTC, ...
- Large non-volatile memory interface (NVRAM, Flash, ...)
- Optimized message passing with four high density FIFOs
- General purpose I/Os
- Four highly programmable 32-bit global timers

PBIT, IBIT

Automatically triggered at power up, PBIT executes several simple checks of main board functions before launching the VMPCBug monitor. IBIT can then be executed, on demand, by using the "auto" firmware command. IBIT executes a comprehensive suite of functional tests and leaves results in the main DRAM of the board. These non-intrusive IBIT tests cover more than 95% of the board's functional nodes. These test results can be read back by the board's operating system, or they can be collected by another VMPC board running the rack supervision software (see PowerLine).

Software

Thales Computers provides a wide range of Operating Systems on its PowerEngine6 SBCs:

- ***Tornado/VxWorks from WindRiver Systems:*** BSP for PowerEngine6 is provided by Thales Computers according to WindRiver's windlink partnership program.
- ***LynxOS from LynuxWorks:*** this real-time environment is jointly supported by Thales Computers and LynuxWorks, ensuring customers the best possible service.
- ***Linux:*** the LynuxWorks version of Linux is supported on VMPC6a. It provides a modern UNIX environment compatible with embedded system requirements.
- ***AIX:*** IBM's popular UNIX operating system is certified on Thales Computers platforms and branded according to the IBM Multi Vendor Platform (MVP) program. This certification guarantees the compatibility at ABI and API levels with the IBM RS/6000 servers and workstations.
- ***PowerLine:*** Thales Computers' own complete range of software toolkits, provides both enhancements and specific tools for real-time applications and cluster architectures.

Thales Computers provides optimized functionality and support by offering customized services, on a "consultancy" basis for system integrators.

Connectivity

- All I/O on Thales Computers' PowerEngine6 SBCs are available either via the front panel or on VME P2 connector (see table on next page).
- For the conduction-cooled version (RC), all I/O are directed to P2 according to IEEE 1101.2-1992 standard.

Thales Computers' Product Warranty and Services

- All of Thales Computers' hardware products are covered by a two-year return-to-factory warranty.
- Several service programs are available, including update services, hotline access, product repair and exchange services, technical assistance, on-site or remote technical assistance.
- ISO 9001: Thales Computers' ISO 9001 certification is just another way for us to back our commitment to quality products and customer service.

Miscellaneous

- Board size: VME double Eurocard (6 U - 233.3 mm x 160 mm)
- Single VME slot
- Convection-cooled version (VMPC6a/RA) carries the ruggedizer but keeps the front panel I/O.
- Conduction-cooled version (VMPC6a/RC) is IEEE 1101.2-1992 compliant and is a single VME slot solution.
- Electromagnetic compatibility:
  NF EN 55022 Class B
  NF EN 50082-2
- All Thales Computers SBCs are EC-compliant.

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VMPC6a Technical Features

CPU

Processor	One or two PowerPC 750
Clock Frequency	450 MHz
MIPS	820 at 450 MHz per processor

MEMORY

Global Memory	64, 128, 256, 512 MB on board
ECC	Yes (standard)
Cache Memory	2 MB default per processor (on processor dedicated bus)
ROM Flash Memory	512 KB/1.5 MB System Flash Memory Up to 32 MB User Flash

VME INTERFACE

- ALMA V64 VME/PCI bridge with semaphore registers
- A32/A24/A16 master/slave
- D64 (MBLT)/D32 (BLT)/D16/D08 master/slave
- 5-row connectors compatible with 3-row backplane

USER PCI INTERFACE

- PCI fully compliant (32/64-bit)
- 1 PMC slot (up to 3 with ICPMC6 carrier card)
- 33 or 66 MHz selectable PCI frequency
- DMA engine: DRAM <-> PCI

INTERNAL PCI INTERFACE

Onboard I/O devices

- PCI Rev. 2 fully compliant
- Fully dual ported with user PCI

SCSI INTERFACE

- Wide Ultra SCSI
  (RA and RC build levels support Fast Wide)

ETHERNET Interface

- On-board 10/100 Mb/s Ethernet interface managed by the INTEL 21143 chip
- 10/100BASE-T connectivity
- 10BASE-T on all build levels
- ANSI 802.3 compliant

MISCELLANEOUS

- 2 asynchronous EIA-232 serial lines - Max: 115.2 Kb/s
- Keyboard/Mouse interface

POWER REQUIREMENTS (maximum)

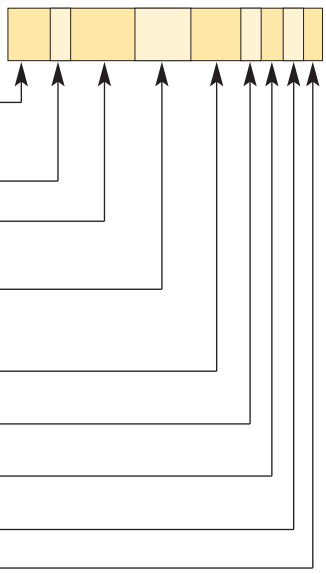
		Single	Dual
+5V (+5%, -2.5%)	450 MHz	6.0A	8.2A

ENVIRONMENTAL SPECIFICATIONS

	SA	WA	RA	RC
Temperature range				
Operating	0° to +55°C	-20° to +65°C	-40° to +75°C	-40° to +85°C
Storage	-45° to +85°C	-45° to +85°C	-45° to +100°C	-45° to +100°C
Conformal Coating	Optional	Standard	Standard	Standard
Relative Humidity	no condensation 90%	95% 10 cycles 240 hours	95% 10 cycles 240 hours	95% 10 cycles 240 hours
Mechanical				
Vibration Sine	5-200 Hz - 2g Peak	5-200 Hz - 2g Peak	5-2000 Hz - 2.5g Peak	5-2000 Hz - 5g Peak
Vibration	0.01 g^2/Hz 10-40 Hz	0.01 g^2/Hz 10-40 Hz	0.04 g^2 Hz	0.1 g^2 Hz
Random	0.0007 g^2/Hz 100-200 Hz - 0.00005 g^2/Hz 2000 Hz		with a flat response to 1,000 Hz 6 dB/Oct roll-off from 1 Khz-2 KHz	
Shock	10g Peak 16 ms Half Sine Pulse		40g Peak 20 ms Half Sine Pulse	
Bumps			40g Peak 6 ms, Half Sine Pulse 3 bumps/sec and 1,000 bumps per direction	
Altitude	-1,000 to 15,000 ft	-1,000 to 15,000 ft	-1,000 to 33,000 ft	-1,000 to 50,000 ft

PowerEngine6 Order Code

		SA	WA	RA	RC	Code
Environment Class	Standard (Air)	x				-
	Extended Temperature (Air)		x			WA
	Rugged Convection-Cooled (Air)			x		RA
	Rugged Conduction-Cooled				x	RC
Processors	Single	x	x	x	x	-
	Dual	x	x	x	x	D
Clock Speed	450Mhz	x	x	x	x	450
SDRAM (*)	64 MB	x	x	x	x	64
	128 MB	x	x	x	x	128
	256 MB	x	x	x	x	256
	512 MB	x	x	x	x	512
Flash	8 MB	x	x	x	x	-
	32 MB	x	x	x	x	F32
Ethernet Link	Front panel is default	x	x	x		-
	Ethernet routed to backplane	Option	Option	Option	Default	1
P0 Connector	No P0 connector is default	x	x	x	x	-
	P0 connector fitted	Option	Option	Option	Option	2
PMC (**) slot VIO Key (PCI signaling voltage)	5V is default	x	x	x	x	-
	3.3V	Option	Option	Option	Option	3
Coating		x	Default	Default	Default	V



(*) Boards with large memory require specific O.S. application management - Please check O.S. type and release

(**) PCI signaling level on the VMPC6a and on the PMC devices should match

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