Embedded Solutions

D601 - Conduction-Cooled 6U CPCI Pentium® M SBC

- **ULV Celeron® M 373, 1 GHz**
- **Up to Pentium® M 760, 2 GHz**
- **32-bit CompactPCI®**
- **4 HP system master or busless**
- **Up to 2 GB DDR2 DRAM soldered**
- **CompactFlash®**
- **2 SATA interfaces**
- **Video via VGA and 1 DVI or LVDS**
- **2 Gigabit Ethernet**
- **3 USB 2.0**
- **-40 to +85°C screened**
- **Conductive cooling**

Equipped with the high-performance Intel® 2-GHz Pentium® M down to the 1-GHz ultra low voltage Celeron® M processor, the single-board computer D601 is a versatile 4HP/6U (single-slot, double-size Eurocard) conduction-cooled CompactPCI® board, designed for rugged embedded systems which require high computing and graphics performance and low power consumption.
The D601 is especially suited for in-flight aerospace applications, for example for monitoring, vision and control systems as well as test and measurement. The robust design together with the low-power Pentium® M processors make the D601 a reliable solution in critical environments with regard to temperature, shock and vibration according to the applicable DIN, EN or IEC industry standards.
The D601 offers a 32-bit/33-MHz interface to the CompactPCI® bus and can alternatively also be used without a bus system.
The DDR2 DRAM is soldered to guarantee optimum shock and vibration resistance. An IDE-driven robust CompactFlash® device offers nearly unlimited space for user applications. Apart from parallel ATA support, two serial ATA lines are available.
The standard I/O is available at the rear and includes graphics supporting two monitors in parallel via an analog VGA and a digital DVI (LVDS) connection, two Gigabit Ethernet interfaces as well as three USB 2.0 ports.
Two watchdogs for thermal supervision of the processor and board temperature as well as for monitoring the operating system complete the functionality of the D601.
The D601 operates in Windows® and Linux environments as well as under major real-time operating systems such as VxWorks® or QNX®. The Award BIOS was especially designed for embedded system applications.
Equipped with Intel® components that come exclusively from the Intel® Embedded Line, the D601 has a guaranteed minimum standard availability of 5 years.

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Technical Data

CPU
- ULV Celeron® M 373 up to Pentium® M 760
  - 1.0 to 2.0GHz processor core frequency
  - 400MHz or 533MHz front-side bus frequency
- Chipset
  - Northbridge: Intel® 915GM
  - Southbridge: Intel® ICH6M

Memory
- 512KB L2 cache integrated in Celeron® M or 2MB L2 cache integrated in Pentium® M
- Up to 2GB SDRAM system memory
  - Soldered
  - DDR2
  - 400MHz or 533MHz memory bus frequency
  - Dual-channel, 2x64 bits
- 4Mbits boot Flash
- Serial EEPROM 2kbits for factory settings
- CompactFlash® card interface
  - Via onboard IDE
  - Type I
  - True IDE
  - DMA support
  - For resistance against shock and vibration the CompactFlash® card can simply be held in place by a standard dust cover on CompactPCI® backplane connector P4

Mass Storage
- Parallel IDE (PATA)
  - One IDE port for local CompactFlash®
- Serial ATA (SATA)
  - Two channels via rear I/O
  - Transfer rates up to 150MB/s

Graphics
- Integrated in 915GM chipset
  - Analog CRT DAC interface support
  - Supports max. DAC frequency up to 400 MHz
  - 24-bit RAMDAC support
  - Maximum resolutions: 2048 x 1536 pixels 16M colors @ 75Hz refresh rate (analog); 1600 x 1200 pixels 16M colors @ 60Hz (digital)
  - Incorporates PanelLink Digital technology (Silicon Image)
- VGA/DVI/LVDS connection via rear I/O

Rear I/O
- USB
  - Three USB 2.0 ports via rear I/O
  - UHCI and EHCI implementation
  - Data rates up to 480Mbits/s
- Ethernet
  - Two 10/100/1000Base-T Ethernet channels
  - Accessible via rear I/O on J3
  - Compatible with PICMG 2.16
  - Ethernet controllers are connected by two x1 PCIe® links
  - Onboard LEDs to signal activity status and connection speed
- PS/2
  - Two ports
  - Accessible via rear I/O

Miscellaneous
- Board controller
- Real-time clock, buffered by a GoldCap
- Watchdog timer
- Temperature measurement
- Onboard user LED for debugging

CompactPCI® Bus
- Compliance with CompactPCI® Core Specification PICMG 2.0 R3.0
- System slot
- 32-bit/33-MHz CompactPCI® bus
- V(I/O): +3.3V (+5V tolerant)

Busless Operation
- Board can be supplied through J1 or J5 connector, all other voltages are generated on the board
- +5V supply through J1 (standard), or:
- +16..+36V supply through J5, using onboard DC/DC converter (option)

Electrical Specifications
- Supply voltage/power consumption:
  - +5V (-3%/+5%), approx. 2.5A (ULV Celeron® M 373), approx. 7.5A (Pentium® M 760)
  - +3.3V (-3%/+5%), approx. 1A
  - +12V (-10%/+10%), approx. 10mA
  - Without a +3.3V supply, the board automatically generates +3.3V and also feeds them to the backplane (3A max.)
- MTBF: 207,653h @ 40°C according to IEC/TR 62380 (RDF 2000)

Mechanical Specifications
- Dimensions: conforming to CompactPCI® specification for 6U boards
- ANSI / VITA 30.1 compliant, conduction-cooled with heat sink and wedge locks
- Weight: 600g (incl. heat sink)

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Technical Data

Environmental Specifications

- Temperature range (operation):
  - 0..+60°C up to -40..+85°C (depending on CPU and SDRAM configuration), conduction-cooled
  - Airflow: min. 10m³/h (Celeron® M 373); min. 15m³/h (all other processors)
- 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: 40g/11ms, 100g/6ms
- Bump: 10g/16ms
- Vibration (sinusoidal): 2g/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), IEC1000-4-2 (ESD) and IEC1000-4-4 (burst)

BIOS

- Award BIOS

Software Support

- Windows®
- Linux
- VxWorks®
- QNX® (on request)
- For more information on supported operating system versions and drivers see Software.

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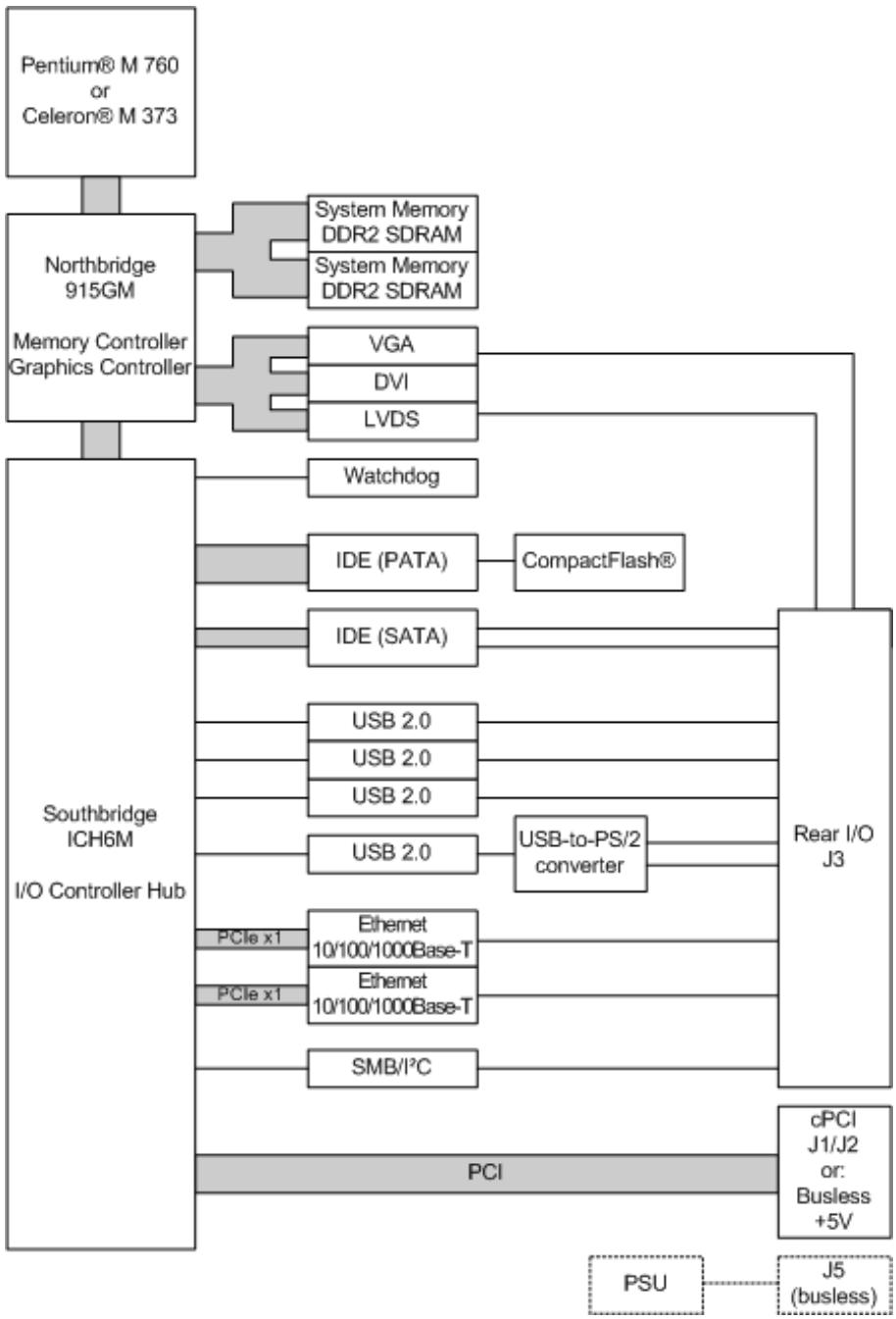
Diagram



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Configuration & Options

Standard Configurations

Article No.	CPU Type	Clock	System RAM	CFlash	Operation Temperature
02D601-00	Pentium® M LV 738	1.4 GHz	1 GB	0 MB	-40..+85°C

Options

CPU

- Celeron® M 373 ULV, 1.0GHz
- Celeron® M 370, 1.5GHz
- Pentium® M 738 LV, 1.4GHz
- Pentium® M 745 LV, 1.8GHz
- Pentium® M 760, 2.0GHz

Memory

- System RAM
  - 256 MB, 512 MB, 1 GB or 2 GB
- CompactFlash®
  - 0 MB up to maximum available

Power Supply

- +16..+36V supply through J5, using onboard DC/DC converter

Operation Temperature

- 0..+60°C up to -40..+85°C
- Depends on board configuration (CPU, system RAM, ...)

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 Hardware

02D601-00	Pentium M 1.4GHz, 1GB DDR2 DRAM, conduction-cooled, -40..+85°C

Memory

0751-0023	CompactFlash card, 2 GB, Type I, -40..+85°C, fixed bit set
0751-0025	CompactFlash card, 512 MB, Type I, -40..+85°C, removable
0751-0026	CompactFlash card, 256 MB, Type I, -40..+85°C, removable
0751-0027	CompactFlash card, 1 GB, Type I, -40..+85°C, fixed bit set
0751-0031	CompactFlash card, 4 GB, Type I, -40..+85°C, fixed bit set
0751-0032	CompactFlash card, 8 GB, Type I, -40..+85°C, fixed bit set

Software: OS independent

13Y001-06	MDIS4/2004 low-level driver sources (MEN) for LM63 on SMBus for F14, F15, F17, F18, D9, D601, A19 and A20
13Y002-06	MDIS4/2004 low-level driver sources (MEN) for F14, F15, F17, F18, D9, D601, A19 and A20 board monitoring
13Y004-06	MDIS4/2004 low-level driver sources (MEN) for generic SMBus driver for F14, F15, F17, F18, D9, D601, F600 and F601, A19 and A20
13Y007-06	MDIS4/2004 low-level driver sources (MEN) for F14, F15, F17, F18, D9, D601, A19 and A20 board controller

Software: Windows

13F014-77	Windows driver installation package Installset (MEN) for F14, F15, F17, F18, D9, D601, A19 and A20
13T001-70	Windows network driver (Intel) for F14, F15, F17, F18, D9, D6, D7, D601, A19, A20 and P601, P602
13T002-70	Windows chipset graphics driver (Intel) for F14 and D601
13T003-70	Windows chipset driver (Intel) for F14, F15, F17, F18, D9, D6, D7, D601, A19 and A20

Software: VxWorks

10F014-60	VxWorks BSP (MEN) for F14 and D601

Software: Firmware/BIOS

14F014-01	System BIOS for F14 and D601

Documentation

20APPN004	Application Note: How to make a USB stick bootable
20D601-00	D601 User Manual
20D601-ER	D601 Errata

For the most up-to-date ordering information and direct links to other data sheets and downloads, see the D601 online data sheet under » www.men.de.

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