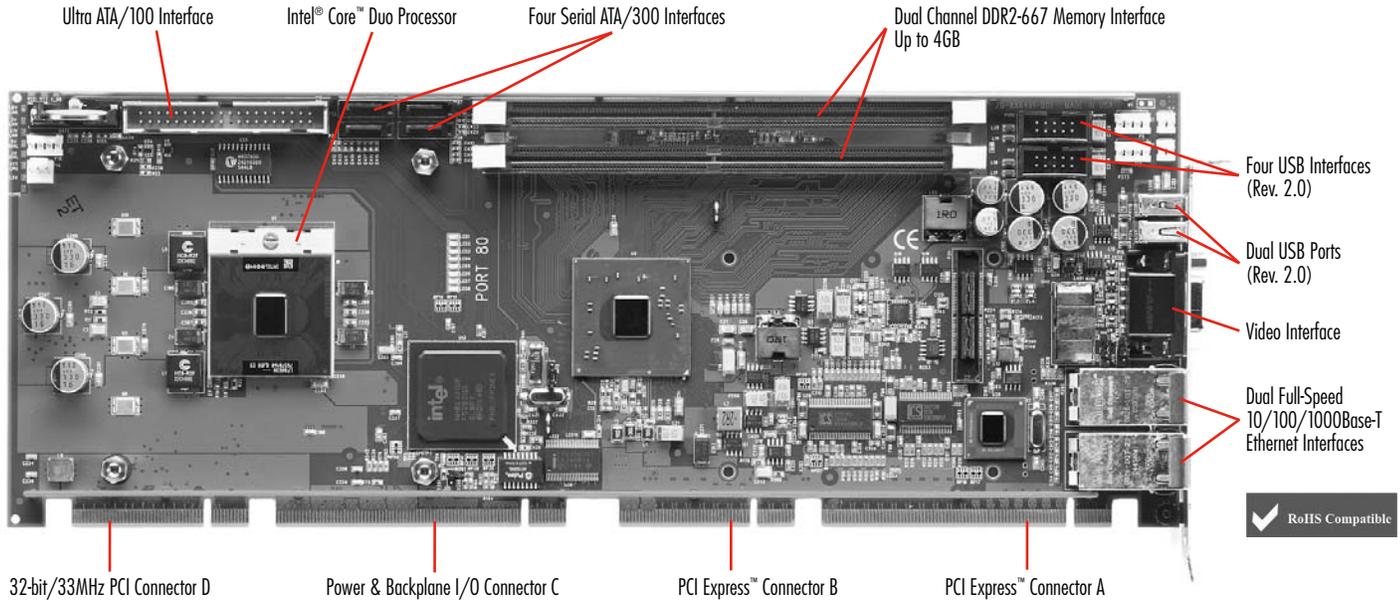


TML (SHB Express™) SYSTEM HOST BOARD



Chassis Plans' TML is a graphics-class, PICMG® 1.3 system host board (SHB) that offers dual-core processor performance with a low profile passive heat sink. The SHB supports x16, x4 and x1 PCI Express™ links, and a 32-bit/33MHz PCI interface to a PICMG 1.3 backplane. The TML handles a wide range of system option cards, from the latest x16 PCI Express video cards to legacy 32-bit/33MHz PCI cards. The dual-core processor options feature shared 2MB L2 cache memories. The Intel® 945G MCH and Intel® ICH7R ICH unlock the advanced capabilities of the TML SHB.

PROCESSOR:

Intel® Core™ Duo Processor at 1.66GHz to 2.0GHz*
 Intel® Core™ Solo Processor at 1.66GHz to 1.83GHz*
 Intel® Celeron® M 420 Processor at 1.6GHz*
 Processor Package: FCPGA6 plugs into an mPGA 478 socket
 *Higher speeds as available

The Intel® processor options on the TML support a 533MHz and 667MHz system bus. The current processor options support 32-bit applications and future options will support 64-bit applications. Other Intel® Core™ Duo Processor features:

- Dual Core, 2MB L2 Cache
- Low thermal design power ratings
- Intel® Active Management Technology (Intel AMT 1.0)
- Enhanced Intel SpeedStep® Technology (EIST)
- Single Core, 1MB L2 Cache (Intel® Celeron® M 420 Processor)

CHIPSET:

The Intel® 945G chipset combines advanced video and graphics capabilities with high-bandwidth interfaces such as a dual-channel DDR2-667, 667MHz FSB, PCI Express x16 graphics port and PCI Express x4 and x1 links to a PICMG 1.3 backplane. An Intel® ICH7R provides eight USB 2.0 and four SATA/300 ports. The ICH7R's SATA controller supports independent DMA, Advanced Host Controller Interface (AHCI) and integrated RAID level 0, 1, 5 and 10 functionality.

PCI EXPRESS™ INTERFACES:

Chassis Plans' TML graphics-class system host board provides one x16 PCI Express link on the SHB's edge connectors A and B. This x16 PCIe link is designed to support PCI Express video/graphics cards on an SHB Express™ (PICMG 1.3) backplane. A x4 PCI Express link and five PCI Express reference clocks are also included on edge connectors A and B. An additional x1 PCI Express link between the TML and backplane can be provided by Chassis Plans' optional IOB31 I/O Expansion Module. The x4 and x1 PCI Express links are used on SHB Express backplanes to support PCI Express option cards and the bridge chips that provide PCI/PCI-X option card support. During system initialization the TML automatically negotiates with the PCI Express cards connected to the PCI Express links in order to set up communication between the devices. The net result is that the TML system host board supports communication to x1, x4, x8 and x16 PCI Express boards as well as PCI/PCI-X cards via PCI Express-to-PCI/PCI-X bridge chip technology. The TML also provides a 32-bit/33MHz PCI bus interface on edge connector D.

DDR2-667 MEMORY:

The DDR2-667 interface is a dual-channel interface originating at the Memory Controller Hub, with each channel terminating at a DIMM module socket. The TML supports system memory transfer rates of either 400, 533 or 667MHz using unbuffered, non-ECC, PC2-3200, PC2-4200 or PC2-5300 DIMMs. Maximum memory capacity is 4GB. When using a single PC2-5300 DIMM, the memory interface bandwidth is 5.4GB/s, and when using two PC2-5300 DIMMs with equal memory capacities the TML's peak memory bandwidth increases to 10.7GB/s.

VIDEO INTERFACE:

The TML supports three video connection options:

- Direct connection via the chipset's Intel® Graphics Media Accelerator 950 with faster graphics and 3D performance
- A x16 PCI Express graphics port that provides 3.5 times more bandwidth than an AGP 8X interface
- ADD2 video and graphic cards

PCI EXPRESS™ CONFIGURATION AND BUS SPEEDS:

PCI Express - Edge Connectors A & B - One x16 link, one x4 link
 - Five reference clocks
 PCI Express - (on-board only) - Two x1 links
 PCI - 32-bit/33MHz
 System or FSB - 533MHz or 667MHz

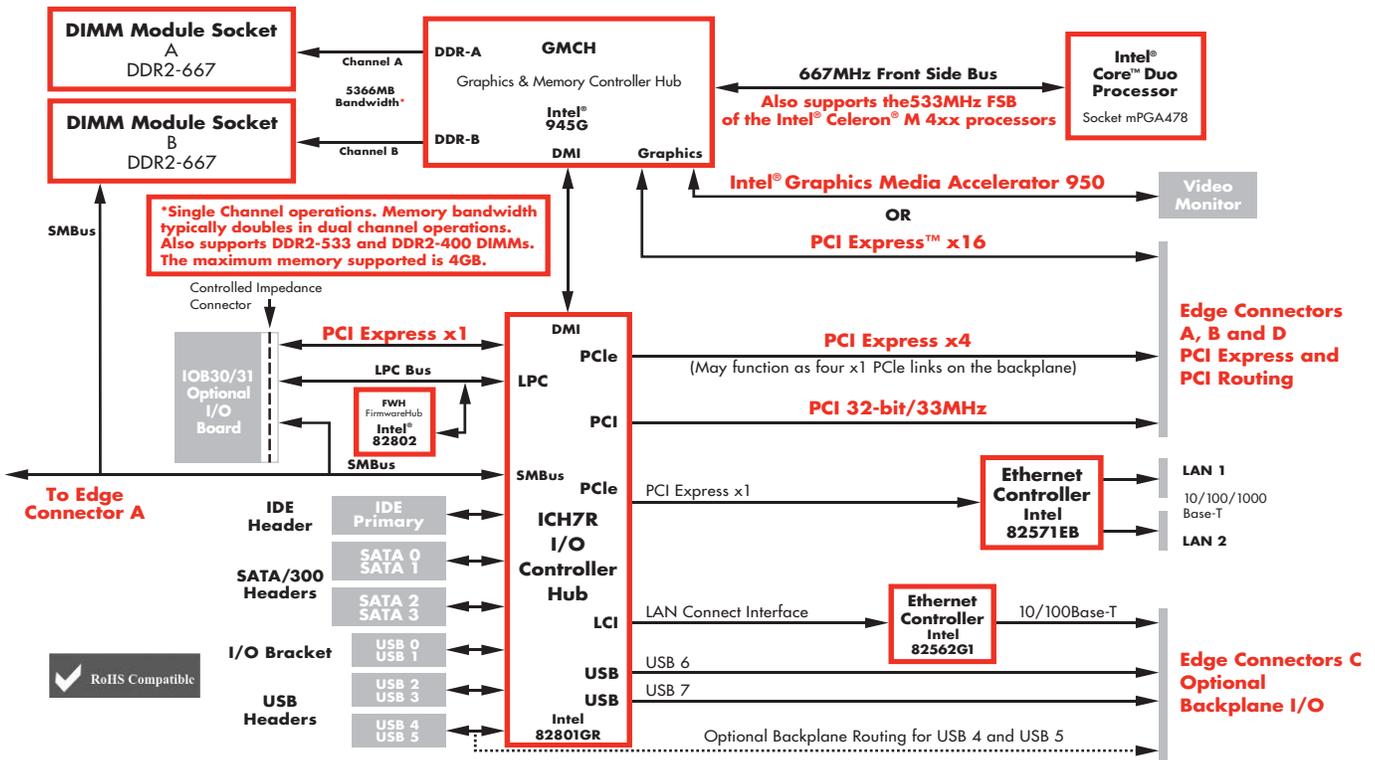
SERIAL ATA/300 PORTS (FOUR):

The primary and secondary Serial ATA (SATA) ports on the TML board support four independent SATA storage devices such as hard disks and CD-RW devices. SATA produces higher performance interfacing by providing data transfer rates up to 300MB per second on each port. The TML's ICH7R I/O Controller hub features Intel® Matrix Storage Technology, which allows the ICH7R's SATA controller to be configured as a RAID controller supporting RAID 0, 1, 5, and 10 implementations.

ETHERNET INTERFACES:

The TML uses an internal x1 PCI Express link to connect the I/O Controller hub to the dual-port Gigabit Ethernet controller chip. This design feature enables dual 10/100/1000Base-T Ethernet interfaces on LAN1 and LAN2. The LAN ports have RJ-45 connectors on the I/O bracket to provide the mechanical interfaces to the Ethernet networks. The ICH7R's internal LAN Interconnect Interface (LCI) provides an additional 10/100Base-T Ethernet interface for use on PICMG® 1.3 backplanes via the SHB's edge connector C.





EIGHT UNIVERSAL SERIAL BUS INTERFACES (USB 2.0):

A total of eight USB 2.0 interfaces are supported by the TML. USB ports 0 and 1 are on the I/O bracket and ports 2, 3, 4 and 5 have header connectors on the TML. USB ports 4 and 5 can be routed to edge connector C for use on a PICMG® 1.3 backplane. The backplane routing for USB 4 and 5 is a factory-build option. Contact Chassis plans for ordering details. USB ports 6 and 7 are routed directly to the TML's edge connector C.

BIOS (FLASH):

The TML uses AMIBIOS®. The flash BIOS resides in the SHB's Firmware Hub (FWH). AMIBIOS8 contains features such as:

- Support for flash devices for BIOS upgrading
- Integrated support for USB mass storage devices such as USB, CD-ROM, CD-RW, etc.
- Boot from network, USB mass storage devices, IDE or ATAPI
- Serial port console redirection to support headless operation (requires optional IOB30/IOB31)
- SATA/ATA/ATAPI support includes 48-bit LBA addressing to support SATA/ATA/IDE hard drive capacities over 137GB

STANDARDS:

- PCI Express™ Base Specification 1.0a
- SHB Express™ System Host Board PCI Express Specification - PCI Industrial Computer Manufacturers Group (PICMG®) 1.3

AGENCY APPROVALS:

Designed for UL60950, CAN/CSA C22.2 No. 60950-00, EN55022:1998 Class B, EN61000-4-2:1995, EN61000-4-3:1997, EN61000-4-4:1995, EN61000-4-5:1995, EN61000-4-6:1996, EN61000-4-11:1994

TML APPLICATION CONSIDERATIONS:

Power Requirements:

Typical Values - CPU Idle State:	+5V	+12V	+3.3V
CPU	2.00A	0.75A	2.75A
2.0GHz*	2.20A	0.75A	2.75A
1.66GHz#	2.10A	0.70A	2.75A

Typical Values - 100% CPU Stress State:	+5V	+12V	+3.3V
CPU	3.50A	2.00A	3.00A
2.0GHz*	3.50A	2.00A	3.00A
1.66GHz#	3.40A	1.40A	3.00A

-12V @ < 100mA
Tolerance for all voltages is +/- 5% and must be applied by the PICMG 1.3 backplane to edge connector C.
(*Intel® Core™ Duo T2500, (#) Intel® Core™ Solo T1300

Temperature/Environment:

Operating Temperature: 0p to 60p C.
Airflow Requirement: 200LFM continuous airflow when using the passive heat sink
Storage Temperature: -40p to 70p C.
Humidity: 5% to 90% non-condensing

Mechanical:

PASSIVE COOLING SOLUTION: The TML has a board stack-up height of .76" (1.93cm) with the SHB's passive heat sink cooling solution. Airflow of at least 200LFM must always be present across the SHB's passive heat sink.

ACTIVE COOLING SOLUTION: The TML's optional active cooling solution has a cooling fan mounted on the passive heat sink resulting in a board stack-up height of 1.16" (2.95cm). Order the TML's active cooling option for chassis designs with an available airflow of less than 200LFM. The overall TML dimensions are 13.330" (33.86cm) L x 4.976" (12.64cm) H. The relative PICMG 1.3 SHB height off the backplane is the same as a PICMG 1.0 SBC due to the shorter PCI Express backplane connectors.

ADDITIONAL TML FEATURES:

System Hardware Monitor:

- The functions monitored are:
 - Voltage: +3.3V, +/-12V, +5V and VCORE
 - Fan speed
 - Temperature

I/O Features:

- One EIDE Ultra ATA/100 interface
- Optional IOB30 I/O plug-in expansion board includes:
 - Enhanced bi-directional parallel interface
 - PS/2 mouse and keyboard interface (mini DIN connector)
 - Floppy drive interface
 - Two high-speed serial ports

ORDERING INFORMATION:

Model Name: TML

Model #	CPU Speed	Intel® No.	Embedded CPU
S6490-207-xM	2.0GHz	T2500	Yes
S6490-203-xM	1.66GHz	T2300	No
S6490-103-xM	1.66GHz	T1300 [†]	No
S6490-703-xM	1.6GHz	420*	Yes
(xM = Memory)	*Intel® Core™ Solo	*Intel® Celeron® M	

The stated bus speed, memory and communication interface speeds are component maximums; actual system performance may vary.

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