TML

PRODUCT DATA SHEET



Trenton's 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 x 16, 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 x 16 PCI Express video cards to legacy 32-bit/33MHz PCI cards. The dual-core processor options feature shared 2MB or 4MB L2 cache memories. The Intel[®] 945G MCH and Intel[®] ICH7R ICH unlock the advanced capabilities of the TML SHB.

PROCESSOR:

Intel® Core™ 2 Duo Processor at 2.0GHz to 2.33GHz* Intel® Core™ Duo Processor at 1.66GHz to 2.0GHz* 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. All processor options support 32-bit applications and the Intel® Core™ 2 Duo Processor T7400 supports 64-bit applications. Other processor features include:

- Dual Core, 2MB or 4MB L2 Cache
- Low thermal design power ratings
- Intel® Active Management Technology (Intel AMT 1.0)
- Enhanced Intel SpeedStep® Technology (EIST)

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:

Trenton's 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 Trenton's optional IOB31 1/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 46B. 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 1/0Controller hub to the dual-port Gigabit Ethernet controller chip. This design feature enables dual 10/100/1000BaseT Ethernet interfaces on LAN1 and LAN2. The LAN ports have RJ-45 connectors on the 1/0bracket to provide the mechanical interfaces to the Ethernet networks. The ICH7R's internal LAN Interconnect Interface (LCI) provides an additional 10/100BaseT Ethernet interface for use on PICMG[®] 1.3 backplanes via the SHB's edge connector C.



TML

PRODUCT DATA SHEET



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 Trenton for ordering details. USB ports 6 and 7 are routed directly to the TML's edge connector C.

BIOS (FLASH):

The TML uses AMIBIOS8 $^{\otimes}$. 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	5.		
Typical Values - (PU Idle State:		
CPU	+5V	+12V	+3.3V
2.16GHz [†]	2.20A	1.70A	2.60A
2.0GHz*	2.20A	0.75A	2.60A
Typical Values - 1	00% CPU Stress	State:	
CPU	+5V	+12V	+3.3V
2.16GHz [†]	3.00A	3.20A	2.60A
2.0GHz*	3.00A	2.00A	2.60A
-12V @ < 100m	Α		
Tolerance for all vo	oltages is +/- 5% (and must be applie	d by the PICMG
1.3 backplane to	edge connector (. (†) Intel® Core™	2 Duo T7400,
(*) Intel® Core™	Duo T2500.		
Temperature/Enviro	nment:		
Operating Tempe	erature: 0° to 60	° C.	
Airflow Poquiror	ont: 2001EM	continuous girflor	u when using

Airflow Requirement: 200LFM continuous airflow when using the passive heat sink Storage Temperature: - 40° to 70° 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 <u>always</u> 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
6490-358-xM	2.16GHz	T7400†	Yes
6490-207-xM	2.0GHz	T2500	Yes
	(xM =	Memory)	
	† Intel® (Core™ 2 Duo	

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

Intel, Intel Core 2 Duo, and Intel Core Duo are trademarks or registered trademarks of Intel Corporation. All other product names are trademarks of their respective owners. Copyright ©2008 by TRENTON Technology Inc. All rights reserved

