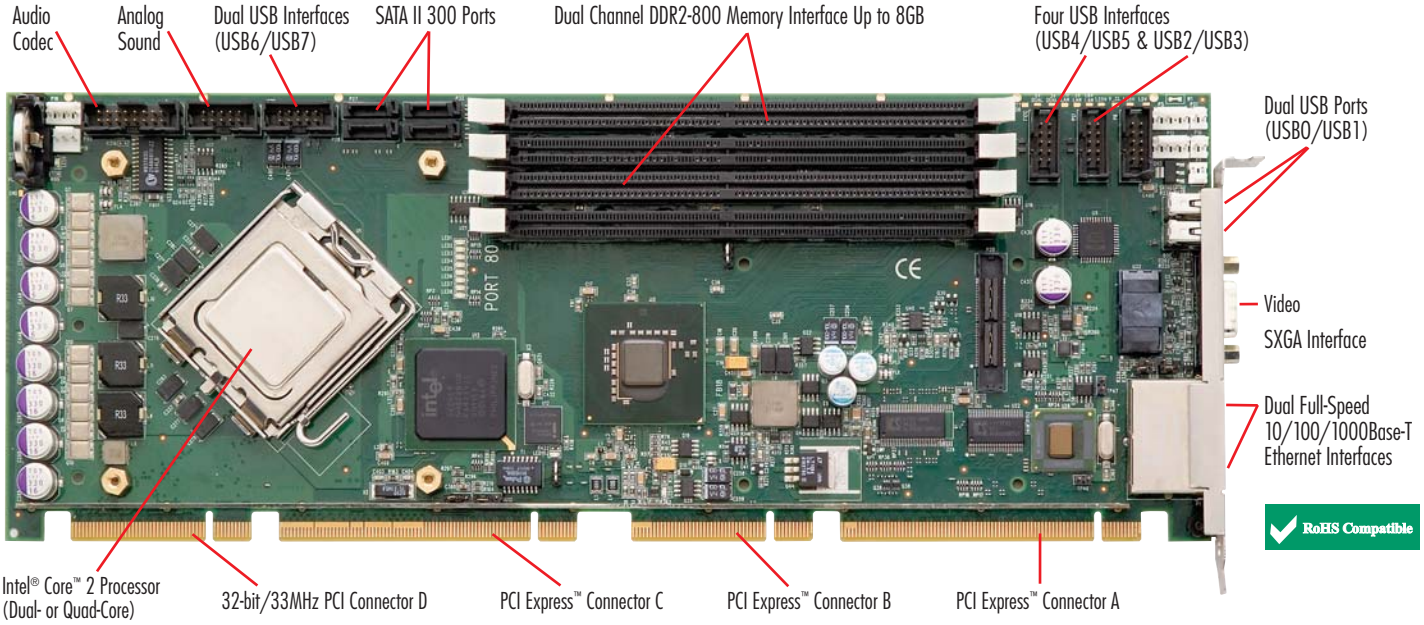
TQ9

PRODUCT DATA SHEET

TQ9 (SHB Express™) SYSTEM HOST BOARD



Trenton's TQ9 is a graphics-class, PICMG® 1.3 system host board that supports a wide variety of single-, dual- and quad-core Intel® processors. New TQ9 I/O interface capabilities include an audio codec interface, two eSATA connections to the backplane and a dozen USB interfaces. The Intel® Q35 MCH and Intel® ICH9DO ICH deliver advanced features like a 1333MHz system bus and SATA RAID. Plugging the TQ9 into a PICMG 1.3 graphics-class backplane enhances system design flexibility. A system designed with the TQ9 supports option cards from x16 PCI Express to legacy 32-bit/33MHz PCI cards.

PROCESSORS:

Intel® Core™ 2 Processor - E8xxx, Q9xxx series
Intel® Core™ 2 Duo Processor - E4xxx, E6xxx
Intel® Pentium® Dual Core Processor - E2xxx series
Intel® Celeron® Processor - 4xx series
Processor Package: LGA775 socket

The Intel® processor options on the TQ9 support a 1333MHz, 1066MHz or 800MHz system bus depending on the choice of processor. All of the processor options support both 64-bit and 32-bit applications. Other processor features:

- Quad-Core processor versions - Q9xxx series
- Dual-Core processor versions - E2xxx, E4xxx, E6xxx and E8xxx series
- Single-Core processor versions - Celeron 4xx series
- 12M L2 Cache (Q9xxx series), 6M L2 Cache (E8xxx series)
- 4M L2 Cache (E6700, E6x50 and E6x20 series)
- 2M L2 Cache (E4xxx series), 1M L2 Cache (E2xxx series)
- 512K L2 Cache (Celeron 4xx series)

CHIPSET:

The Intel® Q35 Express Chipset provides an advanced internal video and graphics port along with a separate x16 PCI Express interface. A dual-channel DDR2-800 memory interface supports four DIMM sockets and up to 8GB of system memory. The TQ9's ICH9DO also provides x1 and x4 PCI Express interfaces plus a 32-bit/33MHz PCI interface. Analog and digital audio capability is built into the Trenton TQ9 via the ICH9DO.

PCI EXPRESS™ INTERFACES:

Trenton's TQ9 graphics-class system host board provides one x16 PCI Express link on the SHB's edge connectors A and B. 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 and reference clock between the TQ9 and backplane can be provided by Trenton's optional IOB31 I/O Expansion Module. The 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 TQ9 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 TQ9 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 TQ9 also provides a 32-bit/33MHz PCI bus interface on edge connector D.

DDR2-800 MEMORY:

The DDR2-800 interface is a dual-channel interface originating at the Memory Controller Hub, with each channel terminating at two DIMM module sockets. The TQ9 supports system memory transfer rates of 800MHz using unbuffered, non-ECC, PC2-6400 DIMMs. The TQ9's four DIMM sockets support a maximum memory capacity of 8GB. When using a single PC2-6400 DIMM, the peak memory interface bandwidth is 6.4GB/s, and placing a PC2-6400 DIMM in each socket of the two memory channels produces a TQ9 theoretical peak memory bandwidth of 12.8GB/s.

VIDEO INTERFACE:

The TQ9 supports three video connection options:

- Direct connection via the chipset's Intel® Graphics Media Accelerator 3100 with faster graphics and 3D performance
- An external video card installed in a backplane's x16 PCI Express slot will use the TQ9's x16 PCIe link 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 or four x1 links - Five reference clocks
PCI Express - (via optional IOB31)	- One x1 link and ref. clock
PCI - Edge Connector D	- 32-bit/33MHz
System or FSB	- 1333MHz, 1066MHz or 800MHz

SERIAL ATA/300 PORTS (ON-BOARD):

The primary and secondary Serial ATA/300 (i.e. SATA II 300) ports on the TQ9 support four independent SATA storage devices such as hard disks, DVD-RW and CD-RW devices. SATA produces higher performance interfacing by providing data transfer rates up to 300MB per second on each port. The TQ9's ICH9DO I/O Controller hub features Intel® Matrix Storage Technology, which allows the ICH9DO's SATA controller to be configured as a RAID controller supporting RAID 0, 1, 5, and 10 implementations.

ETHERNET INTERFACES (I/O BACKET):

The TQ9 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 LAN 1 and LAN2. The LAN ports have RJ-45 connectors on the I/O bracket to provide the mechanical interfaces to the Ethernet networks.

PICMG® 1.3 BACKPLANE I/O INTERFACES:

The TQ9 enables the following PICMG 1.3 backplane I/O connectivity via the SHB's edge connector C:

- Four USB ports (Rev. 2.0)
- Two eSATA interfaces
- One 10/100Base-T Ethernet interface

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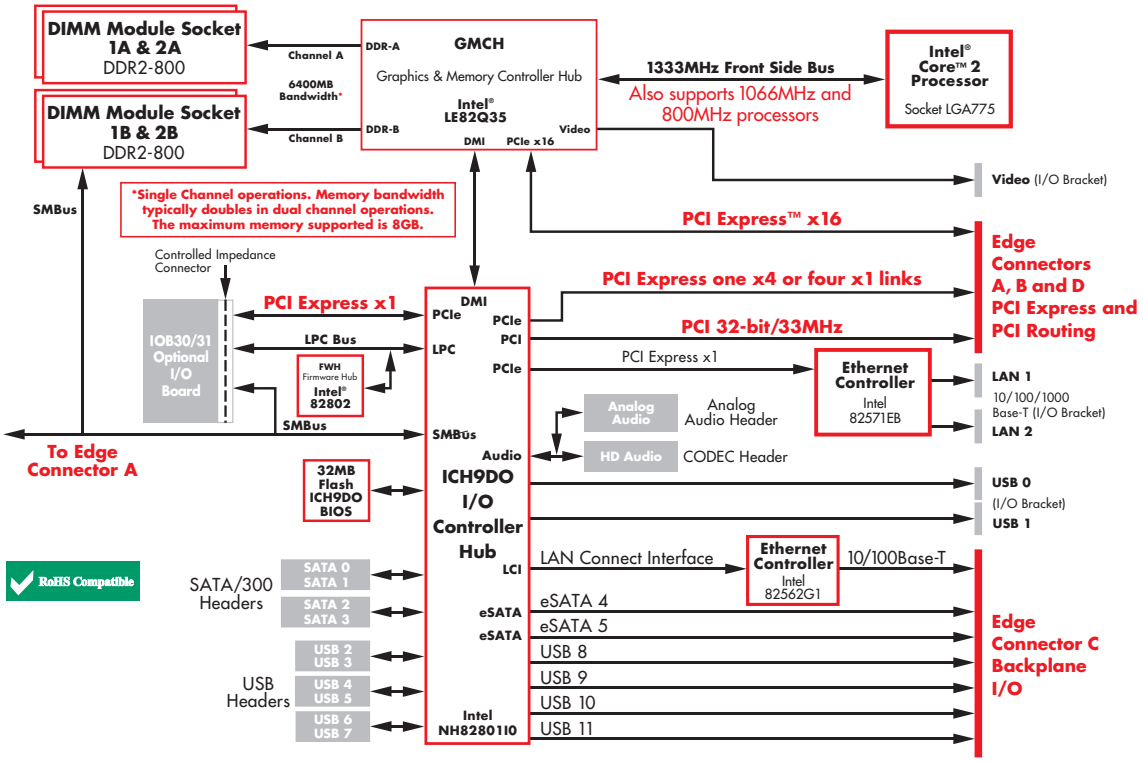

TWELVE UNIVERSAL SERIAL BUS INTERFACES (USB 2.0):

A total of twelve (12) USB 2.0 interfaces are supported by the TQ9. USB ports 0 and 1 are on the I/O bracket and ports 2 through 7 have header connectors on the TQ9. USB ports 8 through 11 are routed to edge connector C for use on a PICMG® 1.3 backplane.

BIOS (FLASH):

The TQ9 uses AMIBIOS8®. 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 flash drives, DVD-RW, CD-ROM, CD-RW, etc.
- Boot from network, USB mass storage devices or SATA/eSATA* drives
- Serial port console redirection to support headless operation (requires optional IOB30/IOB31)
- SATA support includes 48-bit LBA addressing to support SATA and eSATA* hard drives capacities over 137GB

*eSATA drive interfaces are provided for use on a PICMG 1.3 backplane

ADDITIONAL TQ9 FEATURES:

System Hardware Monitor:

The voltage levels monitored are: +3.3V, +12V, +5V, 1.5V, vcc_ddr(1.8V) and vtt_cpu(1.1V or 1.2V)
Fan speed and CPU temperature are also monitored

I/O Features:

Optional IOB3x I/O plug-in expansion boards include:
- Enhanced bi-directional parallel interface
- PS/2 mouse and keyboard interface (mini DIN connector)
- Floppy drive interface and two high-speed serial ports

Watchdog Timer:

The programmable watchdog timer is supported directly by the I/O Controller Hub. Stage one of this two-stage watchdog timer can generate IRQ, SMI or SCI and stage two generates a programmable timer reset with a range of 1ms to 10 minutes.

TQ9 APPLICATION CONSIDERATIONS:

Power Requirements:

Typical Values - CPU Idle State:

CPU Speed	Intel® No.	+5V	+12V	+3.3V
2.83GHz#	Q9550	1.10A	1.75A	2.30A
3.00GHz	E8400	1.10A	1.25A	2.30A
2.13GHz	E6400	1.10A	1.10A	2.30A
1.80GHz	E4300	1.10A	1.10A	2.30A
2.0GHz*	440	1.00A	0.90A	2.30A

Typical Values - 100% CPU Stress State

CPU	Intel® No.	+5V	+12V	+3.3V
2.83GHz#	Q9550	1.20A	4.50A	2.40A
3.00GHz	E8400	1.20A	3.75A	2.40A
2.13GHz	E6400	1.20A	2.10A	2.40A
1.80GHz	E4300	1.20A	2.00A	2.40A
2.0GHz(LV)	440	1.20A	1.90A	2.40A

-12V @ < 100mA

Tolerance for all voltages is +/- 5% and must be applied by the PICMG 1.3 backplane to edge connector C.

All processors listed are dual core CPUs except: (#) quad-core [Yorkfield] Intel® Core 2™ and (*) single-core Intel® Celeron®.

Temperature/Environment:

Operating Temp.	Cooling solution	Processor Type
0° to 60° C.	Standard	Celeron CPUs
0° to 50° C.	Standard	All other CPUs
0° to 55° C.	Low Profile	Celeron CPUs
0° to 45° C.	Low Profile	All dual-core CPUs
0° to 40° C.	Low Profile	All quad-core CPUs

Storage Temperature: -40° to 70° C.
Humidity: 5% to 90% non-condensing

Mechanical:

The standard cooling solution is approximately 2.48" (62.99mm) tall. An optional low profile is available that results in a TQ9 height of 2.20" (55.88mm). The SHB's overall dimensions are 13.330" (33.858cm) L x 4.976" (12.639cm) H. Shorter PCI Express card edge fingers makes the relative height off the backplane the same for both PICMG 1.3 SHBs and PICMG 1.0 SBCs.

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, EN55022:2006 Class B, EN61000-4-2:2001, EN61000-4-3:2005, EN61000-4-4:2006, EN61000-4-5:2006, EN61000-4-6:2006, EN61000-4-11:2004

ORDERING INFORMATION:

Model Name: TQ9

Model #	CPU Speed	Intel® No./FSB	Embedded CPU
6731-426-xM	2.83GHz	Q9550/1333MHz	No
6731-129-xM	3.00GHz	E8400/1333MHz	Planned
6731-022-xM	2.13GHz	E6400/1066MHz	Yes
6731-012-xM	1.80GHz	E4300/800MHz	Yes
6731-503-xM	2.0GHz	440/800MHz	Yes

(xM = Memory)

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

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