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PROCELERANT™

MINI-ITX MOTHERBOARD

QUICK START GUIDE

ENDURA TP945GM

This document helps you to know:

- TP945GM motherboard layout and key components
- Installation, configuration, and operation procedures

Product overview

The Procelerant™ Endura TP945GM mini-ITX motherboard is a standard compact mini-ITX form factor based on the Intel® Core™ Duo, Core 2 Duo and Celeron® M processors and mobile Intel 945GM Express chipset. It supports Microsoft® Windows® XP, Windows XP Embedded, Windows Media® Center, Windows Vista®, Red Hat® Enterprise Linux®, Novell® SUSE® Linux Professional and Knoppix® Linux.

This guide provides information to quickly install, configure and operate the TP945GM motherboard. Refer to the *Procelerant Endura TP945GM Mini-ITX Motherboard Product Manual* for detailed features, functionality and specifications.

For further information, visit the motherboard product pages on the RadiSys Web site, www.radisys.com, for access to datasheets, product documentation, BIOS releases and drivers.

Handling precautions

WARNING
- This motherboard contains static-sensitive components and should be handled with care. Failure to employ adequate anti-static measures can cause partial or complete device failure, performance degradation, or reduced operating life.   - The battery must be replaced with the correct type of lithium cell battery (type CR2032), otherwise there is a risk of damage to the motherboard.   - To avoid electrostatic discharge (ESD) damage upon handling this product, it is strongly recommended that you wear a grounded wrist strap or other static dissipating device. For further precautions and ESD information, visit www.radisys.com/esd and www.esda.org.

Important procedures to note

When installing this motherboard into a chassis or performing upgrades:

- Always disconnect the power cord and plug before assembling or upgrading. Parts on the motherboard can remain powered even when the power supply is switched off unless the power cord is disconnected.
- Route wiring away from sharp edges, heat sources and cooling fans.
- Pay attention to the thermal requirements as stated in the sections that follow. This motherboard requires suitable airflow to maintain an ambient temperature within the operating range.
- When installing expansion cards, pay attention to the maximum loads as stated. Use UL-approved peripheral cards only.

Align the fansink fins for proper airflow

When installing the fansink onto the TP945GM motherboard, the fansink fins should point to the rear I/O panel on the opposite side of the board, as shown in Figure 1. If the fins are turned sideways, as shown in Figure 2, airflow will be restricted and the system may not be adequately cooled.
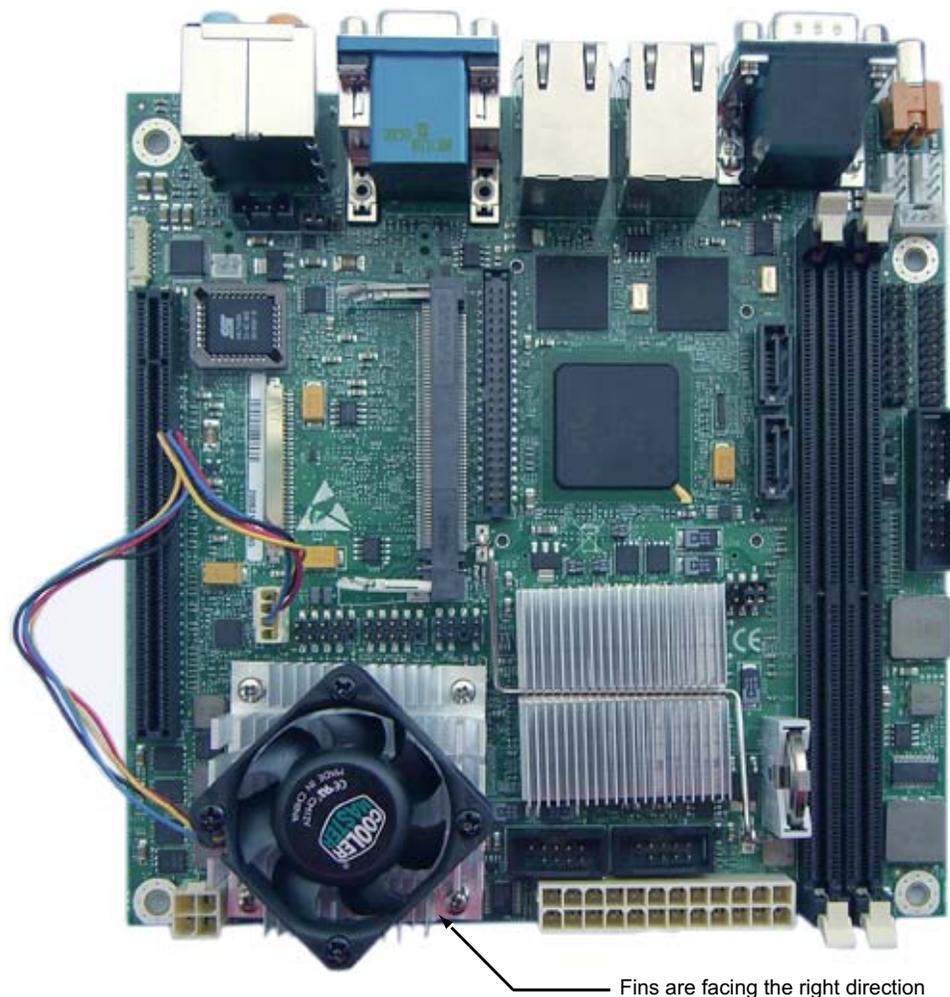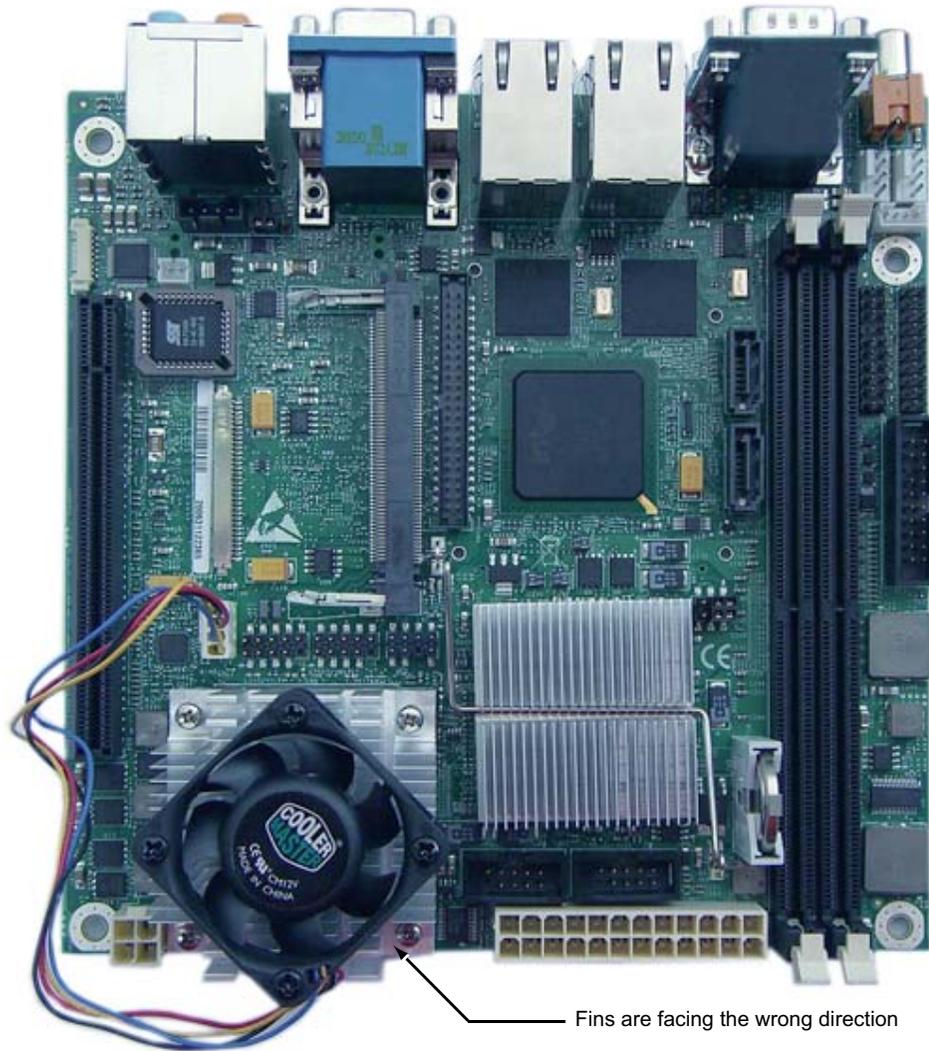
Figure 1. Correct fansink installation

Fins are facing the right direction

Figure 2. Incorrect fansink installation

Fins are facing the wrong direction

Choosing the chassis

When choosing a suitable chassis to accommodate the TP945GM motherboard, the assembly height of the onboard components must be taken into account (Figure 3).

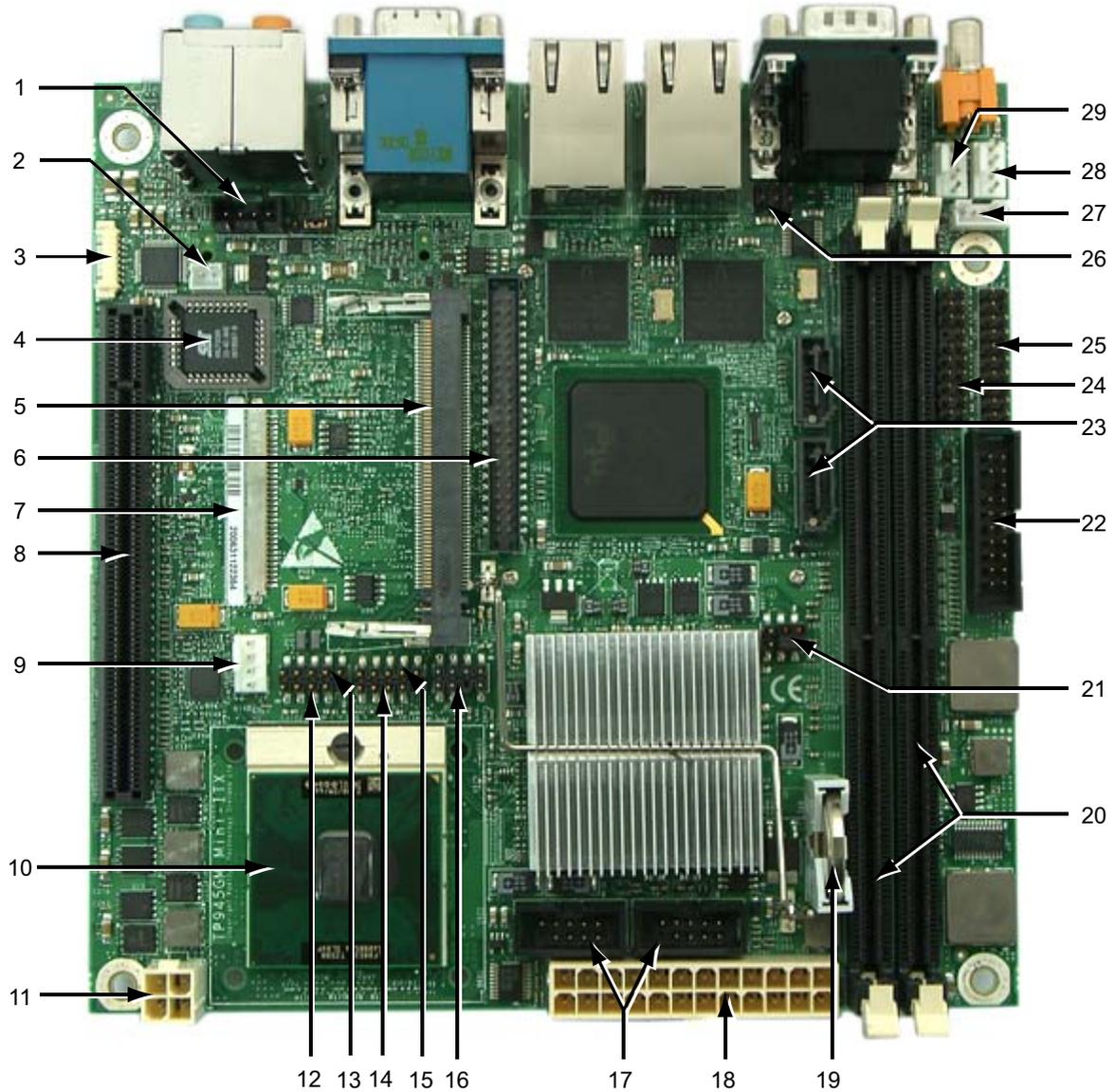### Figure 3. Key assembly component heights
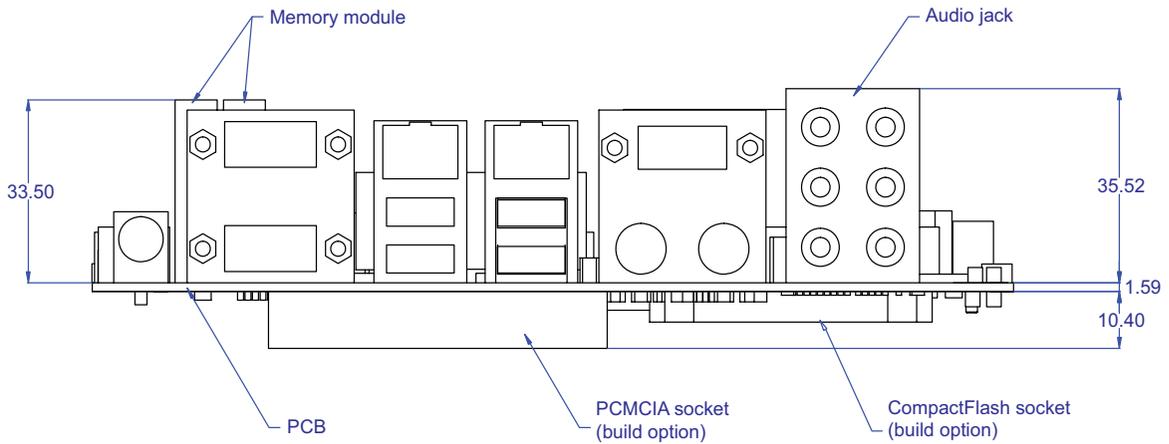
The height of the fansink should also be considered (Figure 4). Be sure to allow a 10mm clearance above the fansink for adequate airflow.

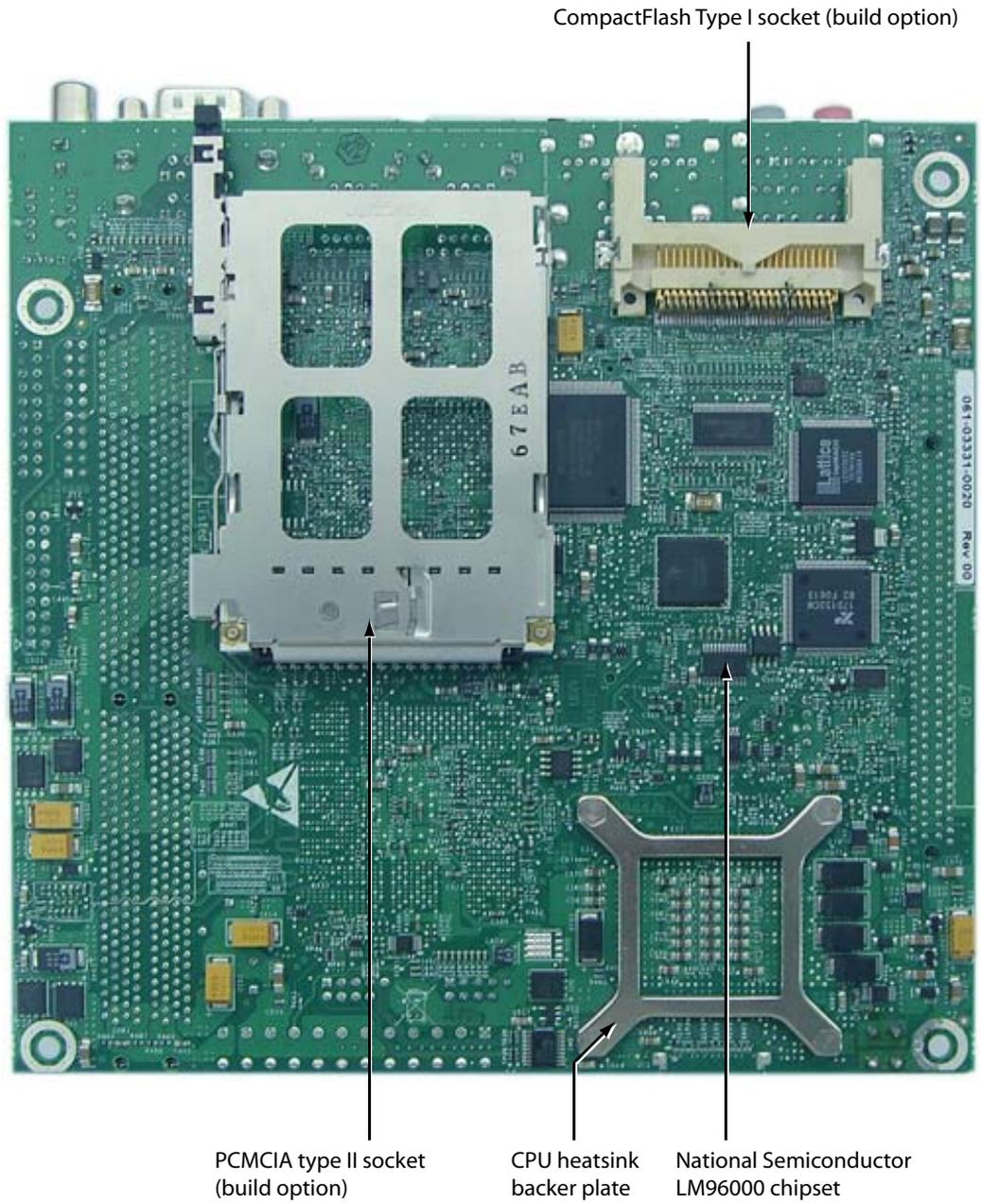### Figure 4. Overall assembly height with fansink installed
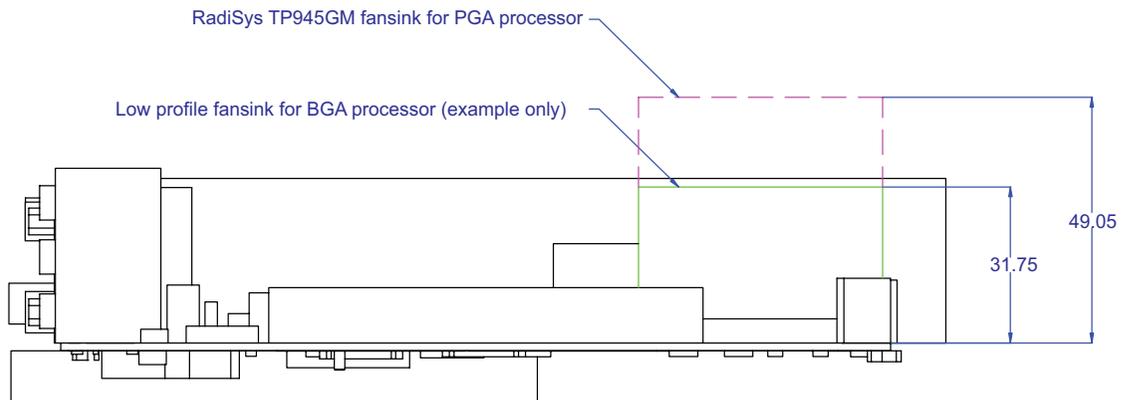
Identifying the components

Figure 5. Motherboard layout: top view

Item	Description	Item	Description	Item	Description
1	IDE/CompactFlash master/slave selection header	11	4-pin ATX 12V connector	21	BIOS operation mode header
2	Remote thermal sensor header	12	USB port 4 header (lower row pins)	22	GPIO header
3	LVDS backlight header	13	USB port 5 header (top row pins)	23	SATA headers
4	BIOS ROM	14	USB port 6 header (lower row pins)	24	Front panel I/O header
5	Mini PCI type IIIA socket	15	USB port 7 header (top row pins)	25	TPM 1.2 header
6	Slim 44-pin IDE connector	16	TV-Out header	26	IrDA header
7	LVDS data connector	17	RS-232 serial headers (COM3 and COM4)	27	SMBus header
8	PCI Express x16 connector	18	24-pin ATX power connector	28	System fan 1 header
9	CPU fan header	19	Battery socket	29	System fan 2 header
10	PGA processor socket/BGA processor	20	DDR2 DIMM slots		

Figure 6. Motherboard layout: bottom view

CompactFlash Type I socket (build option)

PCMCIA type II socket
(build option)

CPU heatsink
backer plate

National Semiconductor
LM96000 chipset

Note
The CompactFlash and PCMCIA sockets are optional, and may not be present on the motherboard you ordered.

Figure 7. Motherboard layout: Rear I/O panel

RS-232 COM port 2, DE9M
RS-232 COM port 1, DE9M
Primary Gigabit Ethernet port, RJ45
Secondary Gigabit Ethernet port, RJ45 (build option)
VGA port, DA15F

S/PDIF out port, RCA
USB port 1
USB port 2
USB port 3
USB port 4
PS/2 keyboard port
PS/2 mouse port
Audio jacks
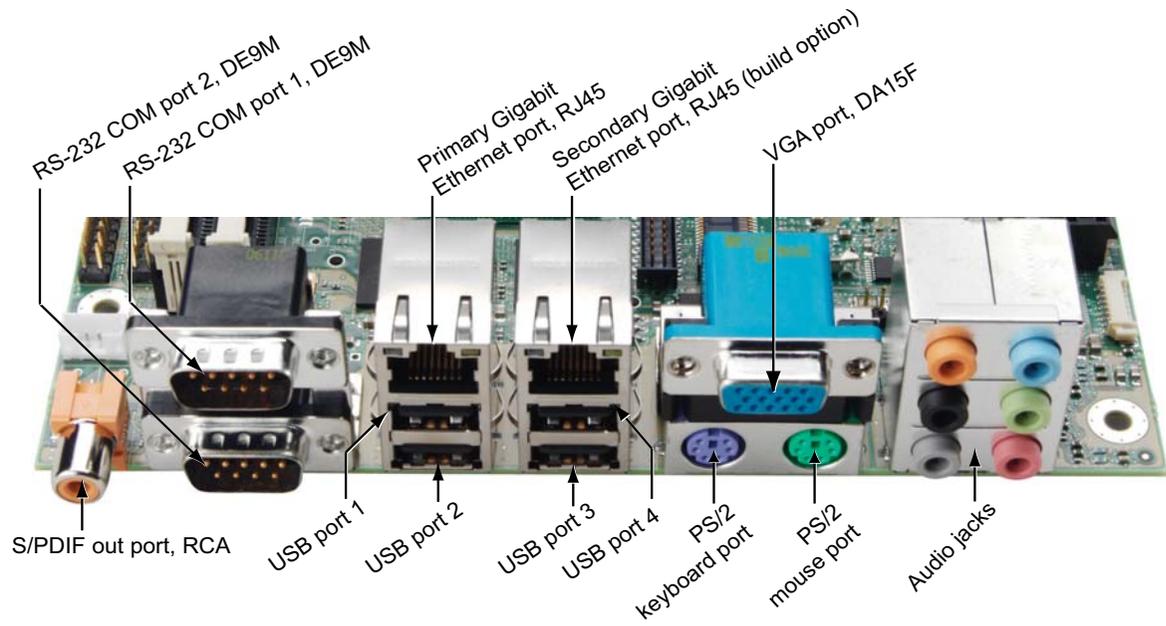
Note
The secondary Ethernet port is optional, and may not be present on the motherboard you ordered.

Installing the TP945GM motherboard

This guide explains how to install the components that are essential to making the system operational, such as the processor, memory module, fansink and video devices. For information about attaching additional peripheral devices, refer to the *Procelerant Endura TP945GM Mini-ITX Motherboard Product Manual*.

Installing the processor

The TP945GM motherboard supports the following embedded Intel processors. Note that the Core Duo LV L2400 and Celeron M ULV 423 processors are only available as BGA processors.

- Intel Core Duo T2500 2.0GHz
- Intel Core Duo LV L2400 1.66GHz
- Intel Core 2 Duo T7400 2.16GHz
- Intel Celeron M 440 1.86GHz
- Intel Celeron M ULV 423 1.06GHz

If a processor you are interested in is not mentioned in this list, refer to the *Procelerant Endura TP945GM Mini-ITX Motherboard Tested Processors List* on the RadiSys Web site for the latest information.

If you have ordered the TP945GM motherboard with a PGA processor socket, insert the CPU onto the PGA processor socket. The location of this socket is in *Figure 5, "Motherboard layout: top view"* on page 5.

Installing the memory

The TP945GM motherboard provides two DIMM memory sockets. It supports 240-pin dual channel DDR2 667/533/400 MHz memory modules in 256MB, 512MB, 1GB and 2GB sizes. At least one memory module must be installed to operate the system.

1. Check the way in which the memory module is keyed to the memory socket. Refer to *Figure 5, "Motherboard layout: top view"* on page 5 for the location of the memory module sockets.

2. Firmly press each memory module into the socket. The ejector tabs will snap into place when it they are fully seated.

Tips
▪ If you plan to install only one memory module, either socket can be used.
▪ For dual channel memory support, install two memory modules of the same size and frequency.
▪ If a total of 4GB memory is installed, only 2.8 - 3.2GB will be available to software applications; the remainder will be used by system resources.
▪ To remove a memory module, open the ejector tabs on both sides of the memory socket and remove the memory from the socket.

Installing the fansink

A fansink is required to prevent overheating and subsequent damage to the CPU.

1. Apply the appropriate thermal interface material onto the CPU.
2. Install the fansink as shown in Figure 8 — Figure 10.

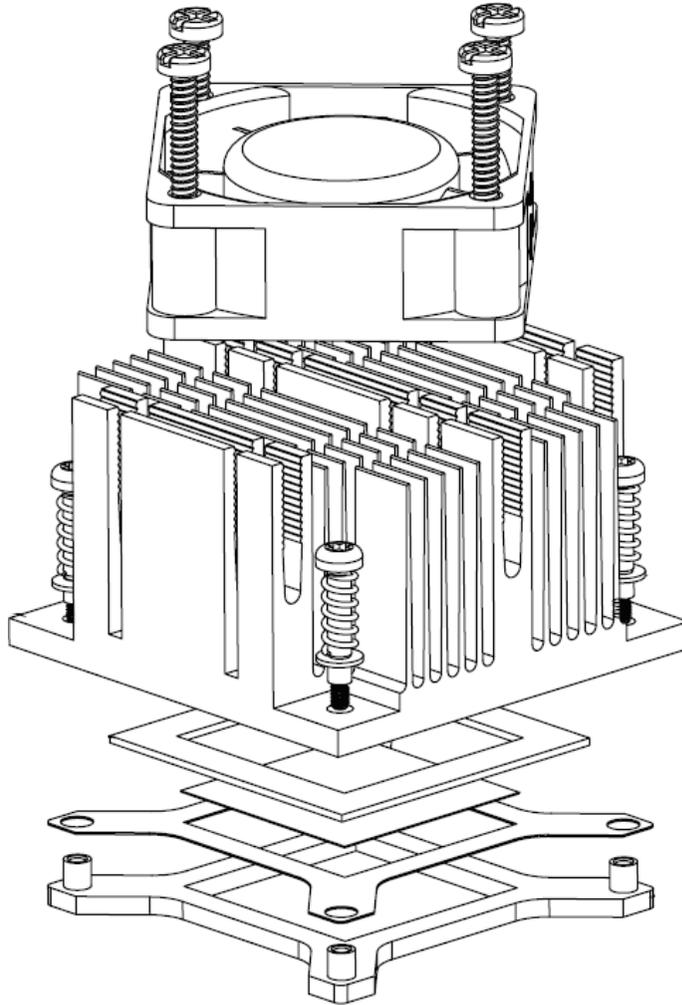**Figure 8. FNSNK-TPSTD assembly option**
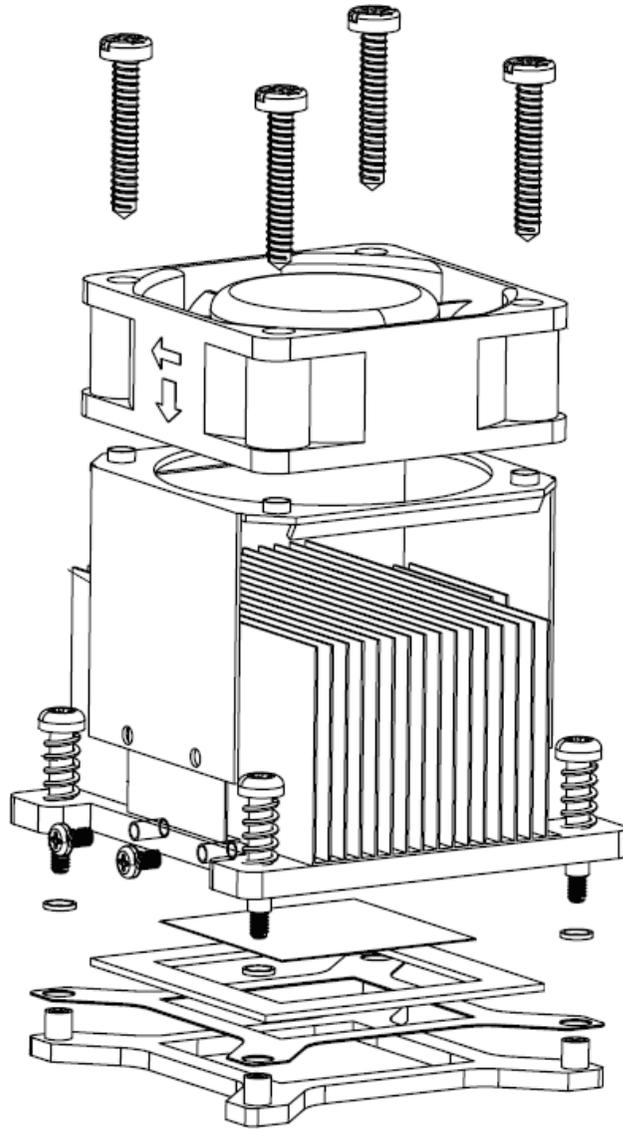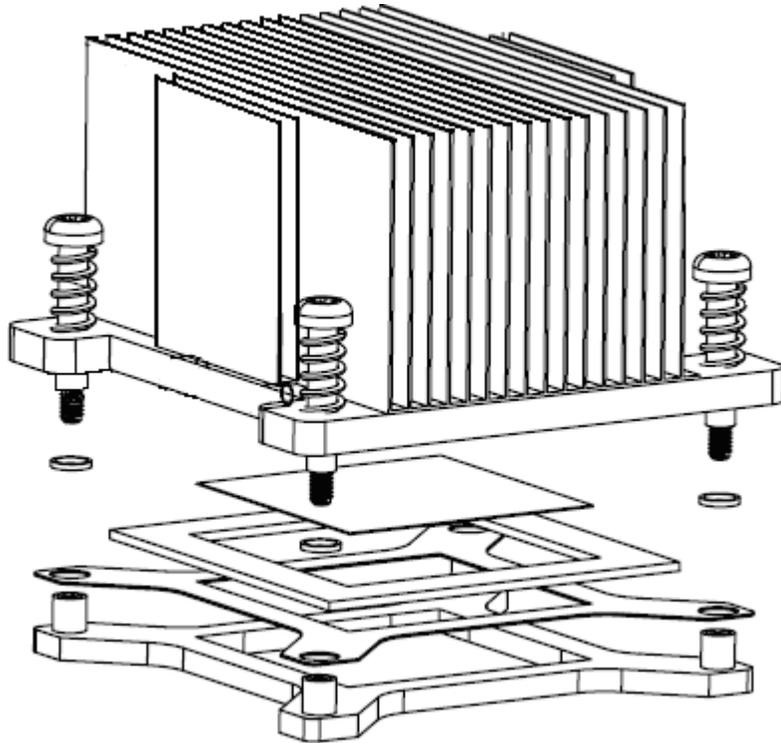
Figure 9. FNSNK-TPXT assembly option

Figure 10. HTSNK-TP assembly option

3. If you are using an active fansink, attach the 4-pin fan connector on the fansink to the motherboard's CPU fan header (*Figure 5, "Motherboard layout: top view"* on page 5, item 10).
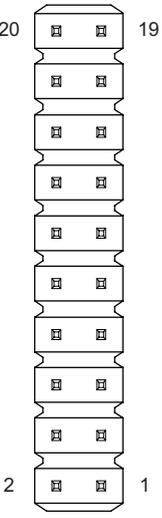
Note
If you are using a fan with a 3-pin connector, refer to the *Procelerant Endura TP945GM Mini-ITX Motherboard Product Manual* for pinouts.

Connecting font panel devices

The following table gives the pinouts for the front panel I/O header. See *Figure 5, "Motherboard layout: top view"* on page 5 for the location of this header.

Table 1. Front Panel I/O Header

Configuration	PIN#	Pin Name & Description
Hard disk LED	1 & 3	Pin 1: HDD_LED_Power, 5V power for hard disk LED Pin 3: HDD_LED#, hard disk read/write activity LED
Front panel reset switch	5 & 7	Pin 5: Ground, ground for FP_RESET# pin Pin 7: FP_RESET#, reset system input
Front panel power button switch	6 & 8	Pin 6: FP_PWRBTN#, power button input Pin 8: Ground, ground for FP_PWRBTN# pin
Front panel yellow LED	4 & 2	Pin 2: FP_YELLOW#, yellow LED lights when the system is at S3 (standby) or S4 (hibernate) status
Front panel yellow LED (ALT)	19 & 15	Pin 15: FP_YELLOW#, yellow LED lights when the system is at S3 or S4 status
Front panel green LED	2 & 4	Pin 4: FP_GREEN#, green LED lights when the system is at S0 (running) status
Front panel green LED (ALT)	15 & 19	Pin 19: FP_GREEN#, green LED lights when the system is at S0 status
Front panel speaker	10 & 12/16	Pin 10: 5V, 5V power for speaker Pin 12: FP_SPKR, speaker Pin 16: FP_SPKR, speaker
Front panel intruder	18 & 20	Pin 18: FP_INTRUDER#, intruder input (case open) Pin 20: Ground, ground for FP_INTRUDER# pin

Connecting video devices

The integrated Intel Graphics Media Accelerator (GMA) 950 video controller on the TP945GM motherboard supports LVDS output at up to 1600 x 1200 32-bit color @ 75Hz and RGB analog output at up to 2048 x 1536 32-bit color @ 75Hz. The motherboard also supports:

- PCI Express x16 graphics cards, or Endura Media Expansion Cards
- Dual independent displays using any of VGA, LVDS, TV output and Media Expansion Card interfaces
- Composite, S-Video, and Component (YPbPr) TV output
- HDTV with 1024 x 768 resolution for NTSL/PAL

Connecting the power supply

The TP945GM motherboard requires either a soft-switched or hard-switched ATX power supply to support high-performance PCI Express graphics cards, which can draw up to 75W. Use a 24-pin connector for the power supply and an additional 4-pin ATX 12V connector for CPU power.

Refer to *Figure 5, "Motherboard layout: top view"* on page 5 for connector locations on the motherboard.

1. Ensure that the AC power cord is disconnected.
2. Attach the 24-pin power supply connector to the 24-pin ATX power connector on the motherboard.

Note
If your system does not need to support high-performance PCI-Express cards, a 20-pin power supply can also be used. Insert the 20-pin power connector to the pin #1 end of the 24-pin ATX power connector, which is marked with an asterisk (*) on the PCB board.

3. Insert the 4-pin power supply into the 4-pin ATX 12V connector.
4. Connect the AC power cord.

Configuring BIOS settings

Most of BIOS configurations are handled by the BIOS setup utility, which stores configuration settings in non-volatile flash memory.

It is a good idea to check the BIOS settings before installing the operating system to make sure the default settings are appropriate for devices you have installed. To enter the BIOS setup utility, press F2 during system boot. After installing the operating system, you may also want to change the boot order in the BIOS, so that the hard disk is checked first.

If problems are encountered during boot up, error messages may be displayed on the monitor. You may also want to use a POST card to determine where the system encountered problems.

For further information, refer to the *Procelerant Endura TP945GM Mini-ITX Motherboard Product Manual* and BIOS setup utility screen help.

Installing the operating system and drivers

The TP945GM has been tested with the following operating systems. Note that some devices drivers may not yet be available.

- Microsoft Windows XP Professional, SP2
- Windows XP Embedded, SP2
- Windows Media Center 2005
- Windows Vista
- Red Hat Enterprise Linux 4.0 AS
- Novell SUSE Linux Professional 10.0
- Knoppix Linux 5.0.1

1. Install the operating system using a bootable CD-ROM. Follow the installation instructions provided with the operating system.

2. Download the drivers for the required operating system from the RadiSys Web site. These are available on the downloads page for the TP945GM motherboard. For detailed instructions on installing each driver, refer to the *Procelerant Endura TP945GM Mini-ITX Motherboard Driver Installation Guide*.

Connecting to your network

The TP945GM motherboard is available with single or dual Gigabit Ethernet ports based on a Broadcom BCM5789 10/100/1000 Mbps Ethernet controller. Connect to the network using the RJ45 connectors located on the rear I/O panel. Each RJ45 connector has integrated LEDs to indicate link status and link activity.

PXE Boot and Wake-On-LAN are also supported.

For further information

Be sure to check the RadiSys web site (www.radisys.com) for additional user documentation, drivers, and other information related to this product.