

Intel[®] Pentium[®] 4 Processor in the 423-pin Package Thermal-Mechanical Support Design Guide

Version 1.0

Reorder Number 249348-001

January 2001

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Version 1.0, December 2000

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Revision History

Version	Revision History	Date
1.0	Initial release	December 2000

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1. Overview

This design guide outlines a successful thermal-mechanical support solution for the Intel® Pentium® 4 processor in the 423-pin package. The recommended solution is one proposed method to support large-mass heatsinks during shipping and handling of the product. Board and system designers should follow the recommendations in this design guide to allow interchangeable ATX motherboards and chassis that support first-generation Pentium 4 processors. It is the responsibility of the supplier, OEM, and system integrator to test and validate the final system solution.

1.1 Related Documents

Table 1. Related Documents

Document	Location
<i>ATX Specification</i> , Version 2.03	http://www.teleport.com/~ffsupprt/

2. Thermal-Mechanical Support Solution

Intel's reference thermal-mechanical support solution for the Intel® Pentium® 4 processor consists of:

- ?? Heatsink
- ?? Heatsink clips
- ?? Thermal interface material
- ?? Retention mechanism(s)
- ?? Chassis standoffs

Large-mass heatsinks on ATX form factor motherboards may cause excessive board deflection during shipping and handling and may cause damage to board-level components. Direct-attach of the retention mechanism to the chassis wall, as shown in Figure 1, is recommended for all Intel® Pentium® 4 processor system solutions.

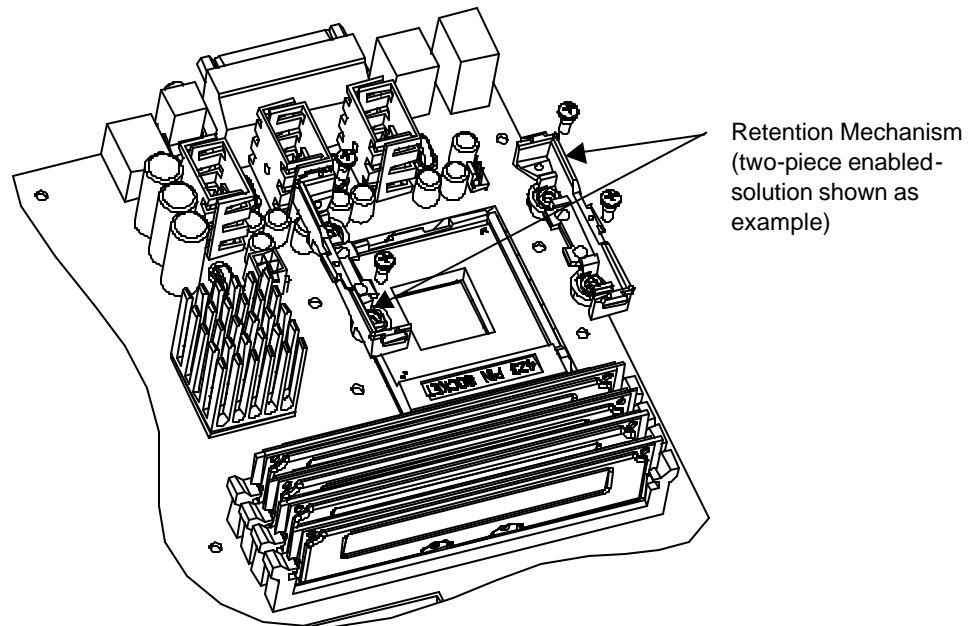


Figure 1. Direct Chassis-Attach Example

Direct chassis-attach is one method that has been tested for managing large-mass heat sinks during mechanical shock and vibration conditions. There may be some chassis, motherboard, and heatsink combinations in which direct chassis-attach may not eliminate the damage induced by large motherboard deflections. It is the responsibility of the supplier, OEM, and system integrator to perform mechanical shock and vibration validation on all shipped configurations.

Table 2 summarizes the design impacts for the direct chassis-attach solution; the impacts are detailed in the following sections.

Table 2. Design Summary

Component Design	Solution
Motherboard	Locate retention mechanism at recommended location
Chassis	Add four (4) removable standoffs at recommended locations

2.1 Motherboard Design

The retention mechanism should be located in relation to the ATX mounting holes as shown in Figure 2 to allow for direct attachment to the chassis. The two-piece enabled retention mechanism cannot be pre-attached to the motherboard. Therefore, motherboards intended for use by system integrators should supply two (2) retention mechanisms and two (2) heatsink clips with each board. Intel boxed processors will not include these components. ATX chassis will provide four (4) removable standoffs and four (4) screws that will attach the retention mechanisms and motherboard to the chassis.

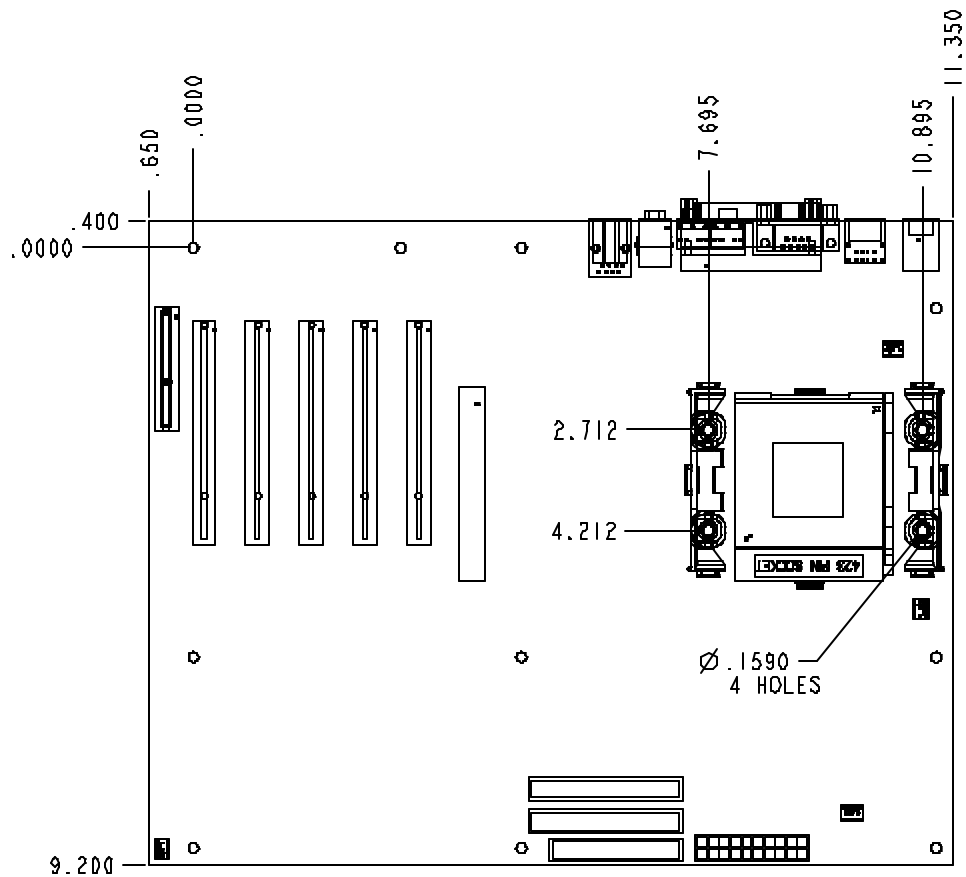


Figure 2. ATX Motherboard Hole Locations for Direct Chassis-Attach

2.2 Chassis Design

The retention mechanism is attached to the chassis via four (4) standoffs, as shown in Figure 3. These standoffs are in addition to the standard ATX mounting holes defined in the *ATX Specification*, Version 2.03. The standoffs must be removable to maintain backward-compatibility with boards that do not support Pentium® 4 processors. The four (4) standoffs for the retention mechanism must be the same height as the standard ATX board standoffs and compatible with 6-32 (x 1/2 inch-3/8 inch) pan-head or round-head screws. It is the responsibility of the chassis vendor to supply the four (4) 6-32 screws with the chassis.

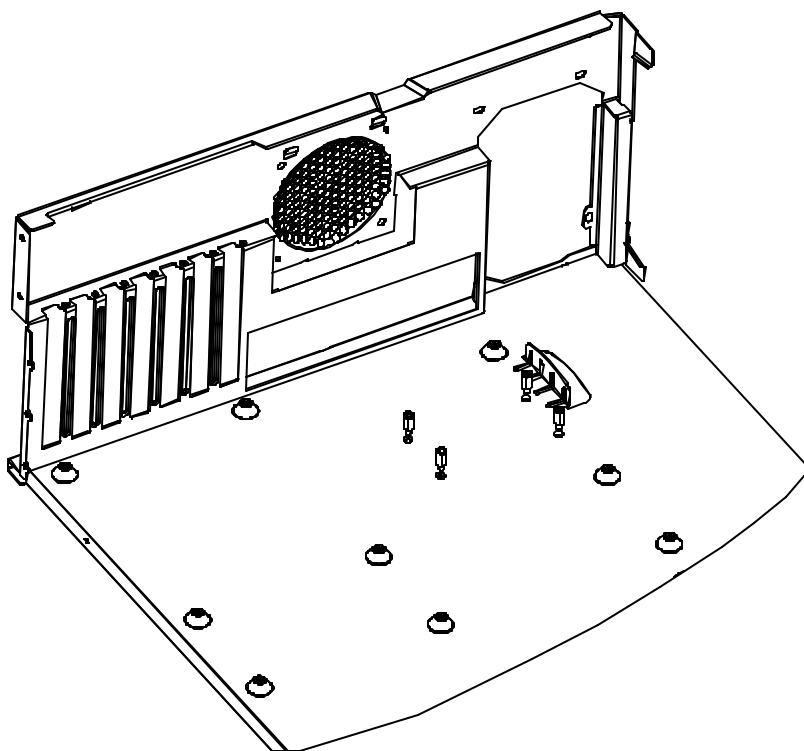


Figure 3. ATX Chassis Mounting Holes for Pentium® 4 Processors

The direct chassis-attach solution has been tested at 30 g (11 ms trapezoidal pulse) unpackaged system shock and 50 g (11 ms trapezoidal pulse) unpackaged board shock to allow for differences in system structural designs. It is the responsibility of the chassis and system designer to ensure that the chassis structure does not transfer greater than 50 g shock to the board at a 30 g system input.

2.3 Hardware

The screws should be 6-32 (x 1/2 inch-3/8 inch) pan-head or round-head screws (four each) for the direct chassis-attach solution. The screw head must be less than 0.284 inch diameter and less than 0.190 inch in height. It is the responsibility of the chassis vendor to supply the four (4) 6-32 screws with the chassis.

3. Conclusion

ATX systems that support Pentium® 4 processors will require additional structural support for large-mass heatsink solutions. The direct chassis-attach solution outlined in this design guide identifies a single tested solution that will allow interchangeable ATX motherboards and ATX chassis combinations. It is the responsibility of the supplier, OEM, and system integrator to validate the final system design to ensure there is no damage to the system components during shipping and handling.