

FlexATX Addendum Version 1.0
to the
microATX Specification Version 1.0

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Revision History

Version	Description	Date
1.0	First release.	3-12-99

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1. Executive Summary

This FlexATX addendum to the *microATX Motherboard Interface Specification* defines a new, small form factor motherboard called FlexATX. The addendum is to be used in conjunction with the governing microATX Specification. This document defines only the features and characteristics of FlexATX that differ from those of microATX.

FlexATX offers the opportunity for system developers to create many new personal computer designs. This addendum allows enhanced flexibility where conforming motherboards may be enclosed; that is, all-in-one computing devices, LCD-personal computers, or standard desktop systems. As a result, this smaller approach to a microATX board also encourages new personal computer forms to be designed for an emerging industry of new users. Therefore the inherent system design “flexibility” of this new form factor will encourage newer forms in the industry. For this reason alone it has been called FlexATX.

While it is a natural evolution of the microATX form factor, FlexATX does not intend to compromise performance or cost features present in technologies today. In fact, it does focus on delivering one method to implement some of the features of an Ease of Use personal computer. Though system designers will ultimately determine how to deliver on the Ease of Use promise, this addendum attempts to capture the major requirements needed for a personal computer of this type to be designed.

This addendum specifies the requirements of only the motherboard and not the system solution. As such, it does not detail the interfaces, processor, memory, or graphics technologies required to develop a successful product design. These are left to the implementer and system designer.

The FlexATX addendum to the microATX specification supports:

- Current socketed processor technologies
- Smaller motherboard size
- The ATX 2.03 I/O panel

This addendum does NOT define:

- The transition to newer processor technologies
- I/O card implementation
- Specific power supply form factors
- Methods to achieve a low-profile design

The FlexATX addendum to the microATX Specification is a public document intended for widespread application in many types of systems. It is available through a public Web site located at:

<http://www.teleport.com/~ffsupprt>

Table 1 summarizes the features of the FlexATX form factor.

Table 1. FlexATX Addendum Feature Summary

Feature	Benefit
9.0" x 7.5" [229 x 191 mm] motherboard, maximum size	Smaller size promotes a smaller system size. Smaller size reduces overall system cost.
Standard ATX 2.03 or later I/O panel	I/O shield does not need to be retooled. Motherboard could be used in an ATX 2.03-compliant chassis (with minor modifications) or in a microATX 1.0-compliant chassis.
Same motherboard mounting holes as in microATX	Current chassis do not need to be retooled. No need to redefine mounting holes.
Socket-only processors	Encourages smaller system designs.

1.1 Other Technical Documents

For additional information, see the series of microATX design guidelines and suggestions on the Platform Development Support public Web site at

<http://www.teleport.com/~ffsupprt>

1.2 Benefits to Users

While offering the same benefits of the ATX and microATX form factor specifications, the FlexATX form factor improves upon the previous specifications in several key areas.

Current trends in the industry indicate that users require a smaller and extensible lower-cost solution for their PC needs. Without sacrificing the benefits of ATX and microATX, the FlexATX form factor addresses the size and cost requirement by reducing the size of the motherboard. The overall effect of these size changes reduces the costs associated with the entire system and allows it to be used in smaller system designs. The expected effect of these reductions is to lower the total system cost to the end user.

Another area of improvement is the reduced size of the chassis and thus the space it occupies on the user's desk. This reduced size improves the aesthetic value for the end user and promotes higher satisfaction with system ownership.

1.3 Benefits to Manufacturers

By manufacturing a FlexATX motherboard, an OEM can capitalize on the benefits of a reduction in total system costs because of several reasons. First is the ease with which the motherboard and system solution can be integrated. Second is the design reuse of a motherboard to be placed into multiple enclosures for a multitude of purposes. Third is the reduction in system size.

Where possible, the existing mounting locations in the FlexATX form factor are aligned with those that exist in microATX 1.0.¹ This alignment reduces the possible changes to existing microATX 1.0-compliant chassis and encourages the rapid adoption of the new FlexATX form factor. See Section 2.2 for mounting hole locations.²

FlexATX benefits also include those found with the current microATX form factor: more I/O space at the back and reduced emissions from using integrated I/O connectors.

1.4 Mounting FlexATX Motherboard in a microATX Chassis

If the standoff for mounting hole R is removable in the microATX 1.0-compliant chassis, it is recommended that it be removed before installing the FlexATX motherboard in the chassis to avoid possible damage to the board.

However, if the standoff for mounting hole R cannot be removed, the FlexATX motherboard has a **required keepout zone on the secondary side** to avoid damage to the board when it is installed on top of the fixed mounting hole.

1.5 Mounting FlexATX Motherboard in an ATX Chassis

To mount a FlexATX motherboard in an ATX 2.03-compliant chassis, two new mounting holes are required in the chassis, holes B and S. However, ATX motherboards do not use these mounting holes, and the removable mounting standoffs must be removed before an ATX board is placed back into the ATX chassis.

¹ Throughout this document, references to microATX 1.0 refer to microATX Version 1.0 *or higher*; references to ATX 2.03 refer to ATX Version 2.03 *or higher*.

² Current ATX 2.03 chassis require additional motherboard mounts for compatibility with microATX and FlexATX.

2. Layout

This section describes the mechanical specification of the FlexATX form-factor motherboard, including physical size, mounting hole placement, and component height constraints.

2.1 Board Dimensions

Table 2 compares the FlexATX board dimensions with those of other ATX form factors.

Table 2. FlexATX, microATX, and ATX Board Dimensions

Form factor of board	Maximum width allowable	Maximum depth allowable
FlexATX	9.0 inches (229 mm)	7.5 inches (191 mm)
microATX	9.6 inches (244 mm)	9.6 inches (244 mm)
ATX, full-size	12.0 inches (305 mm) *	9.6 inches (244 mm)
Mini-ATX	11.2 inches (284 mm)	8.2 inches (208 mm)

* Same width as a full AT board; allows many existing AT form-factor chassis to accept Baby AT, Full AT, ATX, or Mini-ATX form-factor boards with a minimum number of changes.

2.2 Mounting Hole Placement

Table 3. Motherboard Mounting Hole Locations

Feature	Status	Comment
Motherboard mounting hole locations	Required	See Figure 1 for an overview and Figure 2 for exact hole locations. All six FlexATX board mounting locations shown should be implemented in the chassis for full FlexATX compliance.

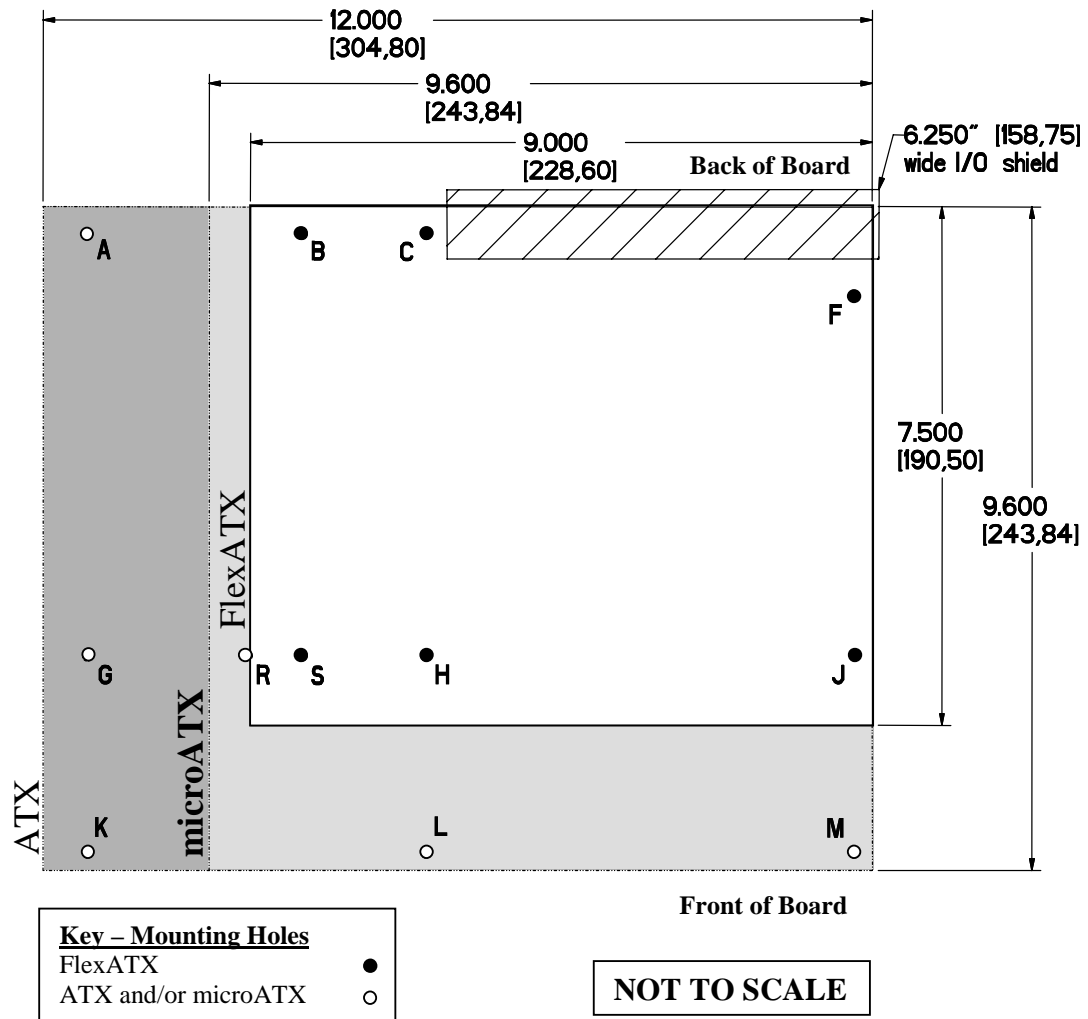
The FlexATX mounting holes line up with mounting holes used for microATX and ATX boards.

- Figure 1 shows the relative outlines of the FlexATX, microATX, and ATX board form factors. The letter callouts show the general location of the mounting holes for the three form factors. The table lists which holes are required for each form factor.
- Figure 2, the example layout diagram, shows the exact location (dimensions) of the mounting holes for FlexATX boards.

Chassis: To achieve full FlexATX compliance for chassis assemblies and to provide proper support for the board in these areas, all six FlexATX board mounting locations shown in Figure 1 should be implemented in the chassis.

Motherboard: The board design can incorporate any combination of the FlexATX mounting holes shown in Figure 2 if a given board design is smaller than the 9.0 x 7.5-inch [229 x 191 mm] maximum size.

To avoid damage to traces on FlexATX, microATX, and ATX motherboards, chassis standoffs in any locations not specified for these three form factors should be removable or should not be implemented at all.



Form factor	Mounting hole locations	Notes
FlexATX	B, C, F, H, J, S	
microATX	B, C, F, H, J, L, M, R, S	Holes R and S were added for microATX form factor. Hole B was defined in Full AT format.
ATX	A, C, F, G, H, J, K, L, M	Hole F must be implemented in all ATX 2.03-compliant chassis assemblies. The hole was optional in the ATX 1.1 specification.

Figure 1. FlexATX and ATX Form-factor Mounting Holes

Notes

- The shaded portions indicate the greater size of the ATX and microATX form factors.
- For details about mounting holes and board sizes, see Figure 2.

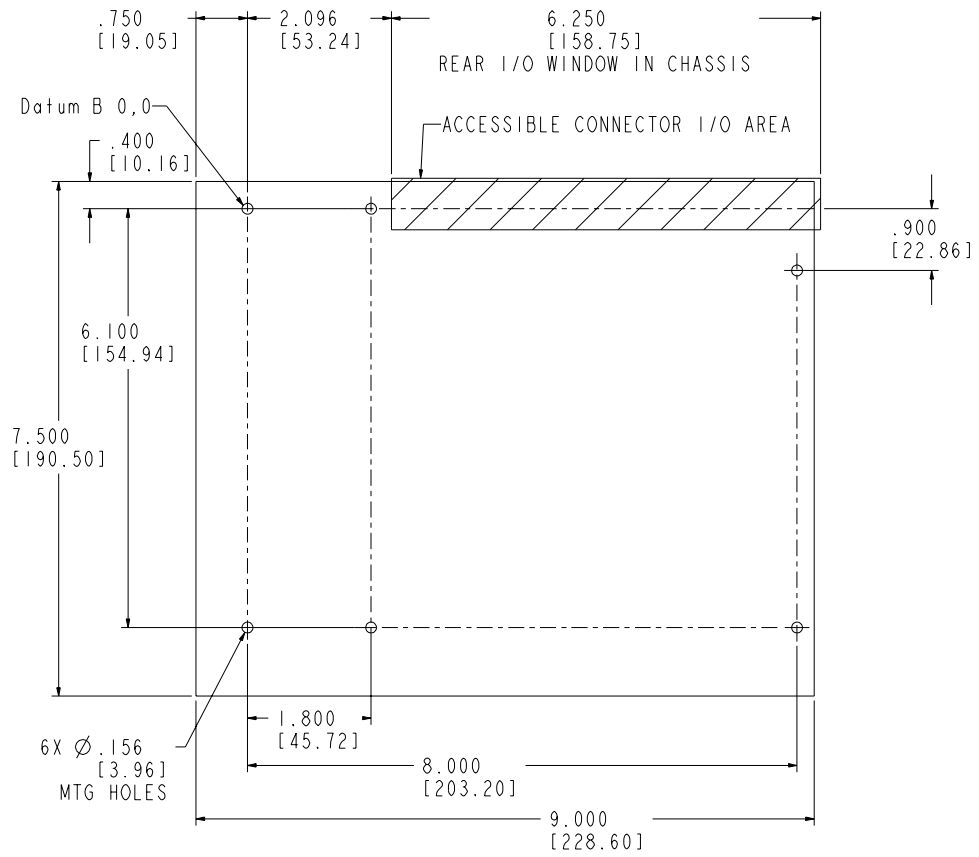


Figure 2. Example FlexATX Layout Diagram

Note

- Datum B 0,0 = mounting location hole B.

2.3 Height Constraints

One of the major advantages of the FlexATX form factor is its backward-compatibility with the microATX and ATX specifications. The FlexATX motherboard can be installed in any microATX or ATX chassis. For the required **maximum component height constraints** for the components on the motherboard, see Table 4 and Figure 3.

The height of connectors and the mating connector cable (i.e., power, IDE, floppy, and fan connectors) must be considered when placing the components within the component height restrictions on the motherboard. For full compliance with FlexATX and to prevent interference with the chassis structure, power supply, or peripherals, the motherboard components should not exceed the height limit in each zone defined. Similarly, the power supply, peripherals, and chassis features should not extend into the motherboard component area.

To maintain strict compliance to the FlexATX specification, careful placement of peripherals, power supply, and chassis features is required.

Table 4. FlexATX Motherboard Maximum Component Height Restrictions

Area in Fig. 3	Maximum component height (in inches)	Status
A	FlexATX motherboard maximum component height: 2.10 inches [53.34 mm] maximum	Required
	FlexATX chassis keepout (chassis clearance over motherboard): 2.3 inches [58.42 mm]	Required
	FlexATX chassis keepout (chassis clearance over motherboard): 2.8 inches [71.12 mm]	Recommended
Note the .2 inch difference between the 2.1-inch required motherboard maximum component height and the 2.3-inch required chassis keepout area.		
B	0.60 inches [15.24 mm]	Required
C	1.50 inches [38.10 mm] (see Notes)	Required
D	1.20 inches [30.48 mm] (see Notes)	Required
E	0.35 inches [8.89 mm]	Required

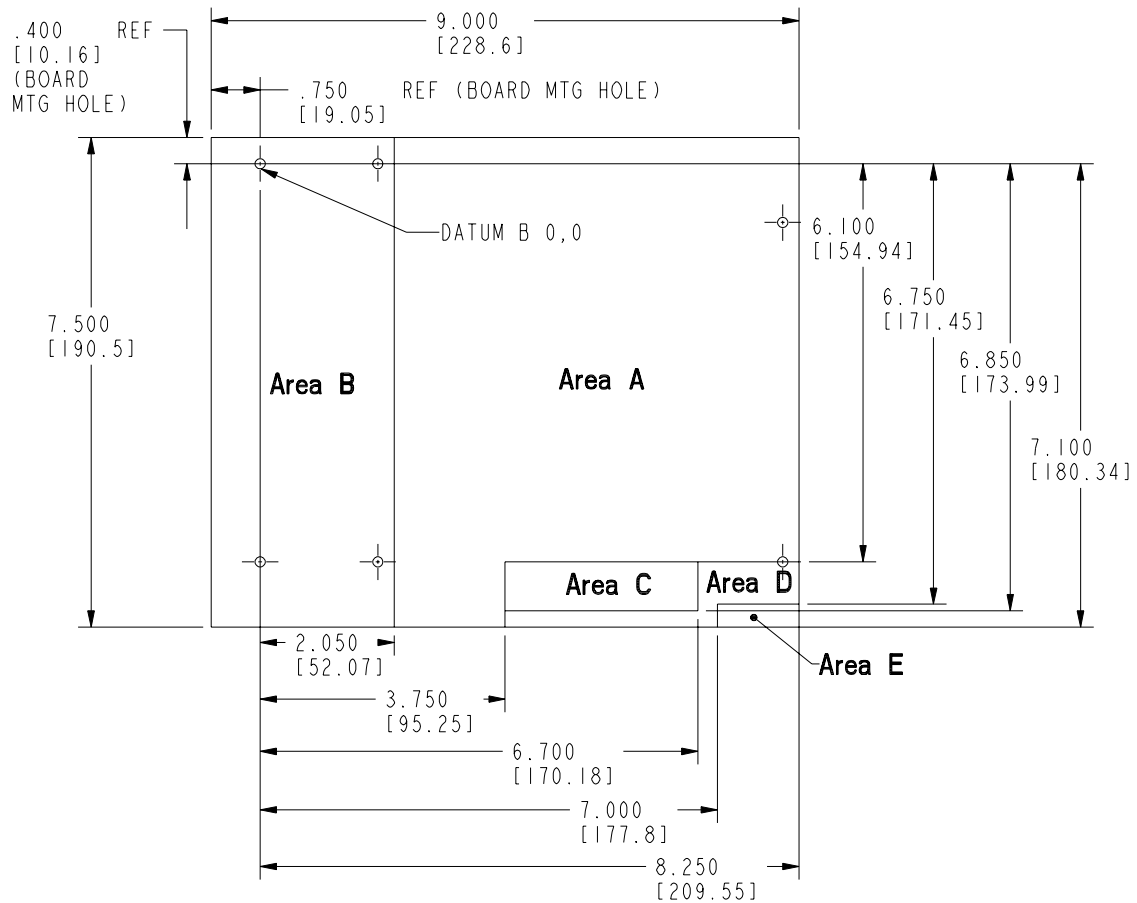


Figure 3. FlexATX Motherboard Maximum Component Height Restrictions

Notes

- Datum B 0,0 = mounting location hole B.
- The component height requirement assumes a motherboard thickness of 0.062" (1.57 mm). The maximum heights specified for Areas C, D, and E are intended to avoid interference between motherboard components and the chassis structure and to provide backward-compatibility with ATX 2.03 or higher.
- **For ATX and microATX only:** the required chassis keepout for Area A is 3.0 inches (76.20 mm) to facilitate dynamic considerations of components in this area on the motherboard. The preferred (recommended) clearance is 3.5 (88.90 mm) inches to facilitate cooling solutions that require ducting.

2.4 Secondary Side Keepout Zone

To allow FlexATX boards to be fully backward-compatible with microATX-compliant chassis, a secondary side keepout zone is required for FlexATX boards. No traces, through-hole devices, or surface mount devices are allowed within the keepout zone defined in Figure 4.

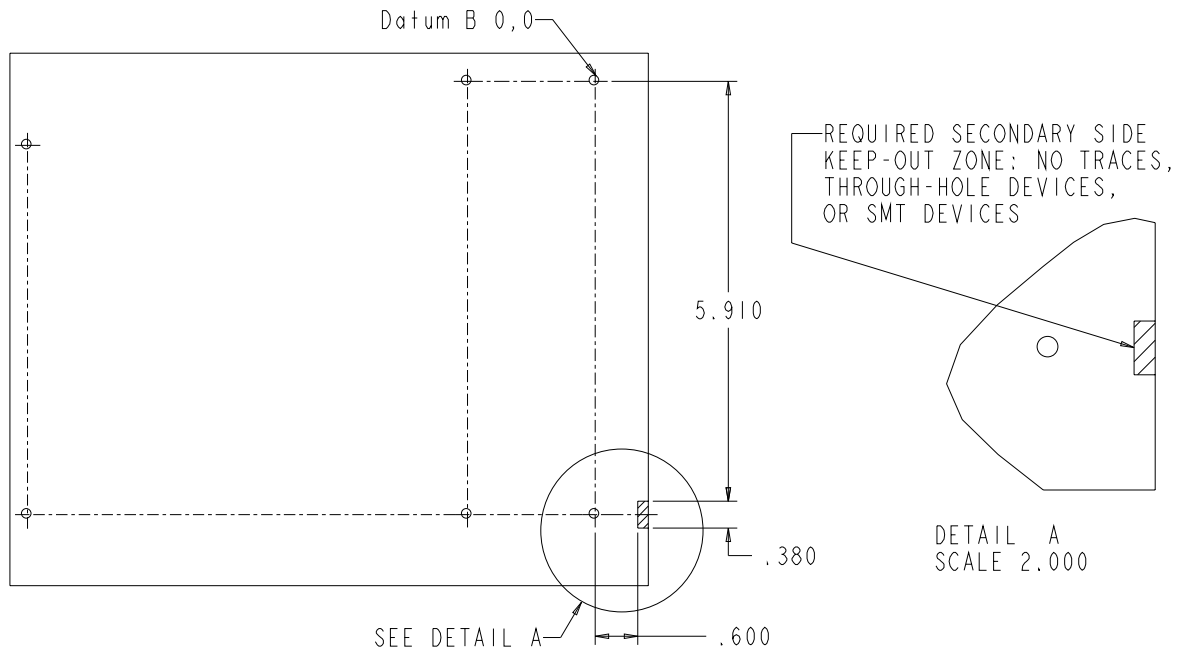


Figure 4. FlexATX Motherboard Secondary Side Keepout Zone

Engineering Changes

(Ratified)

ECR#: P02

Tracker #:

Status: Ratified

Title: New Component Height Restriction Area

Release Date: August 1999

Impact, High: Motherboard and chassis

**Spec Version: FlexATX Addendum Version 1.0 to the microATX
Motherboard Interface Specification V1.0**

Summary:

Because of a 32 percent reduction in area between FlexATX and microATX motherboards, the FlexATX component height restrictions may not allow enough flexibility in placing tall components on the motherboard. The height of the connector and mating connector cable for devices such as power, IDE, and floppy must be considered when placing components within the component height restrictions on the motherboard. For example:

- Some IDE assemblies measure ~0.720 inch [18.29mm].
- Most power cable assemblies measure ~1.200 inches [30.48mm].

If such connectors are placed on the motherboard in Area B where the specified maximum component height is only 0.600 inch [15.24mm], there is potential for interference with system components.

This ECR specifies a **new area** on the front, left side of the motherboard to allow greater height for motherboard components. We have modified Figure 3 to represent the new keepout area.

Change Current Specification As Shown:

On page 10, replace Table 4 with the new table provided below. Area F is new.

Table 4. FlexATX Motherboard Maximum Component Height and Keepout Restrictions

Area in Fig. 3	Maximum component height and keepout restrictions from motherboard primary side	Status
A	Maximum component height on motherboard: 2.100 inches [53.34mm]	Required
	Chassis keepout (chassis clearance over motherboard): 2.300 inches [58.42mm]	Required
	Chassis keepout (chassis clearance over motherboard): 2.800 inches [71.12mm]	Recommended
	Note: there is a .200-inch difference between the 2.100-inch required motherboard maximum component height and the 2.300-inch required chassis keepout area.	
B	0.600 inch [15.24mm]	Required
C	1.500 inches [38.10mm] (see Notes below Figure 3)	Required
D	1.200 inches [30.48mm] (see Notes below Figure 3)	Required
E	0.350 inch [08.89mm]	Required
F	1.200 inches [30.48mm] (see Notes below Figure 3)	Required

At the end of Section 2.3, replace Figure 3 with the new figure provided below. The last two note paragraphs below the figure are new.

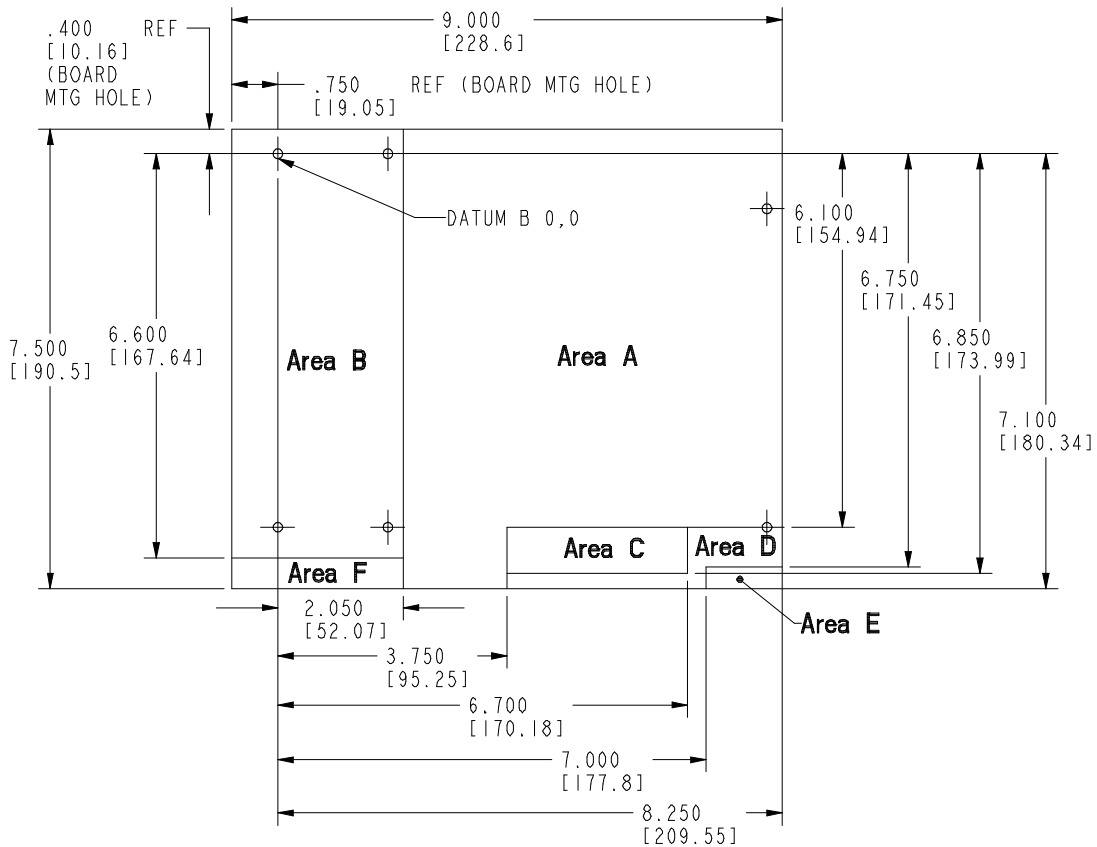


Figure 3. FlexATX Motherboard Maximum Component Height Restrictions

Notes

- Datum B 0,0 = mounting location hole B.
- The component height requirement assumes a motherboard thickness of 0.062 inch [1.57mm]. The maximum heights specified for Areas C, D, and E are intended to avoid interference between motherboard components and the chassis structure and to provide backward-compatibility with ATX 2.03 or higher.
- **For ATX and microATX only:** the **required** chassis keepout for Area A is 3.000 inches [76.20mm] to facilitate dynamic considerations of components in this area on the motherboard. The **recommended** (preferred) clearance is 3.500 [88.90mm] inches to facilitate cooling solutions that require ducting.
- Short length PCI adapter cards, as defined in the *PCI Local Bus Specification*, may be used in Area B without interfering with Area F. Longer adapter cards may be used if components in Area F remain less than 0.600 inch [12.24mm].
- System designers must take care to allow room for locking tabs on memory modules between Areas A and B.