Thermal Design Guide for Socket SP3 Processors

Publication #	55423	Rev:	3.00
Issue Date:	November 2017		

© 2017 Advanced Micro Devices, Inc. All rights reserved.

The information contained herein is for informational purposes only, and is subject to change without notice. While every precaution has been taken in the preparation of this document, it may contain technical inaccuracies, omissions and typographical errors, and AMD is under no obligation to update or otherwise correct this information. Advanced Micro Devices, Inc. makes no representations or warranties with respect to the accuracy or completeness of the contents of this document, and assumes no liability of any kind, including the implied warranties of noninfringement, merchantability or fitness for particular purposes, with respect to the operation or use of AMD hardware, software or other products described herein. No license, including implied or arising by estoppel, to any intellectual property rights is granted by this document. Terms and limitations applicable to the purchase or use of AMD's products are as set forth in a signed agreement between the parties or in AMD's Standard Terms and Conditions of Sale.

Trademarks

AMD, the AMD Arrow logo, and combinations thereof are trademarks of Advanced Micro Devices, Inc. Other product names used in this publication are for identification purposes only and may be trademarks of their respective companies.

Reverse engineering or disassembly is prohibited.

Contents

Revision History **6**

Chapter 1 Introduction **7**

Chapter 2 Socket SP3 Processor and Socket Geometry **8**

2.1 Socket SP3 Processor Package Description 8

2.2 Socket SP3 Description 9

Chapter 3 Socket SP3 Processor Thermal Solution Design **11**

3.1 Motherboard Component-Height Restrictions 11

3.2 Heatsink Design Requirements 12

List of Figures

Figure 1. Socket SP3 Processor Package Drawing. 8
Figure 2. 3-D View of the Socket SP3 9
Figure 3. Heatsink Attachment Critical Dimensions on SAM Stiffener Frame (all dimensions in mm) 10
Figure 4. Motherboard Keepout Zone and Maximum Allowable Component Heights for SP3 Processor Heatsinks 11

List of Tables

Table 1. Socket SP3 Processor Heatsink Design Requirements/ Parameters 12

Revision History

Date	**Revision**	**Description**
October 2017	3.00	Initial public release.

Chapter 1 Introduction

This public document provides guidance for thermal and mechanical design of thermal solutions for systems based on the AMD Socket SP3 processor. Included in this document are:

- Socket SP3 processor package and socket description
- Socket SP3 processor heatsink thermal and mechanical design requirements

The thermal solution should maintain the processor temperature within specified limits. Thermal performance of the socket and other system components should be considered in the design of a thermal solution. Additional guidance may be provided if the user establishes a non-disclosure agreement (NDA) with AMD.

Chapter 2 Socket SP3 Processor and Socket Geometry

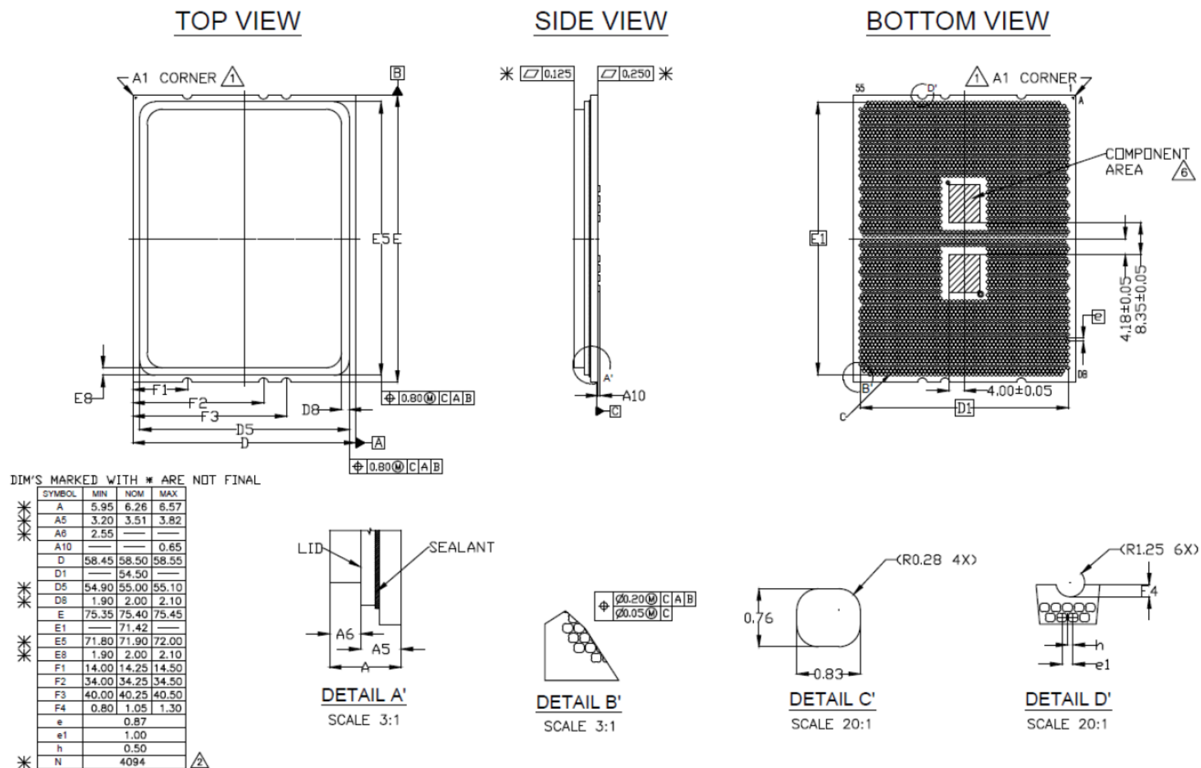
This chapter describes the processor package and socket geometry for systems based on socket SP3 processors.

2.1 Socket SP3 Processor Package Description

The Socket SP3 processor is a 4094-position organic land grid array (OLGA) package with substrate dimensions of 58.5 mm x 75.4 mm. The Socket SP3 processor is designed to be functional only in the lidded package configuration.

The lid has an outline of 55 mm x 71.9 mm, with a lid flange width of 2 mm. The surface of the lid in contact with the heatsink has dimensions of 51 mm x 67.9 mm.

Figure 1 shows a dimensioned drawing of the processor package.



	SYMBOL	MIN	NOM	MAX
*	A	5.95	6.26	6.57
*	A5	3.20	3.51	3.82
*	A6	2.55	—	—
	A10	—	—	0.65
	D	58.45	58.50	58.55
	D1	—	54.50	—
*	D5	54.90	55.00	55.10
*	D8	1.90	2.00	2.10
	E	75.35	75.40	75.45
	E1	—	71.42	—
*	E5	71.80	71.90	72.00
*	E8	1.90	2.00	2.10
	F1	14.00	14.25	14.50
	F2	34.00	34.25	34.50
	F3	40.00	40.25	40.50
	F4	0.80	1.05	1.30
	e	0.87		
	e1	1.00		
	h	0.50		
*	N	4094		

Figure 1. Socket SP3 Processor Package Drawing.

2.2 Socket SP3 Description

Figure 2 shows a three-dimensional view of the 4094-position surface-mount land-grid array (SMLGA) socket used with Socket SP3 processors. The LGA socket is designed to provide a reliable electrical interconnect between the printed circuit board (PCB) and the 4094 pads of the OLGA package.

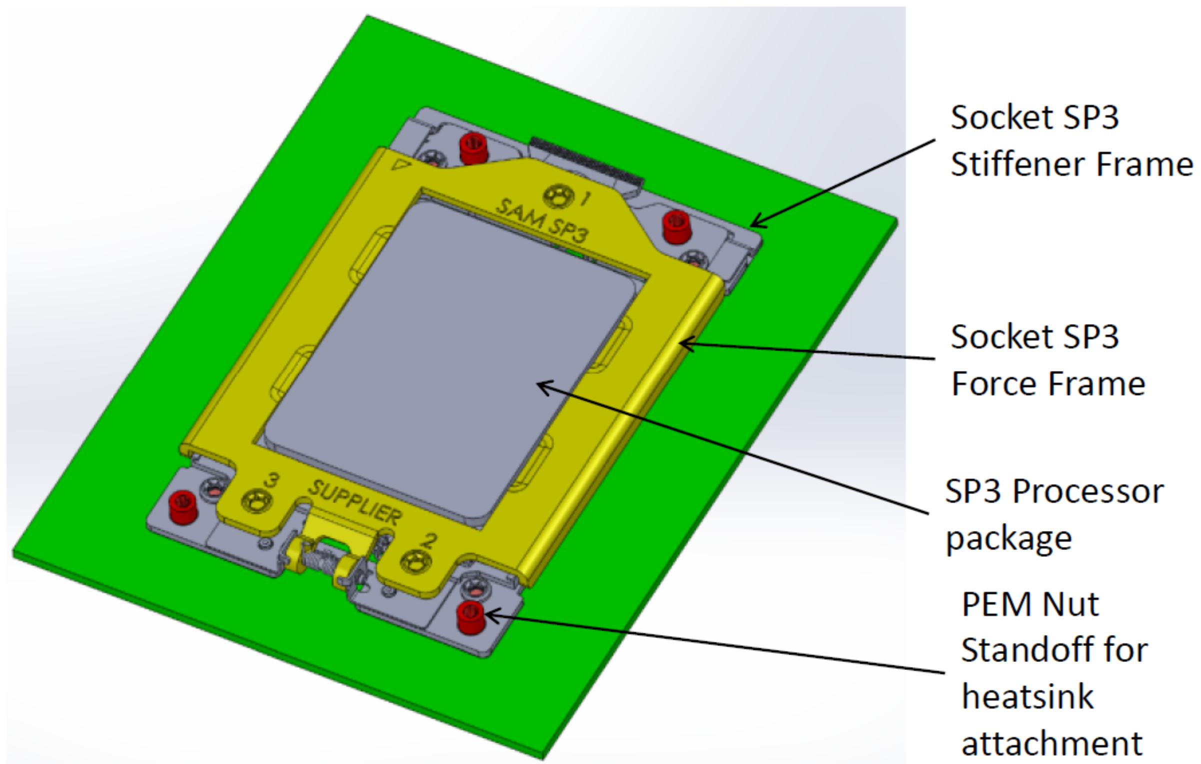


Figure 2. 3-D View of the Socket SP3

The heatsink for the Socket SP3 processor should be designed to attach to four M3.5x0.6 PEM standoffs on the SAM stiffener frame (see Figure 3 for PEM locations and critical stack-up dimensions).

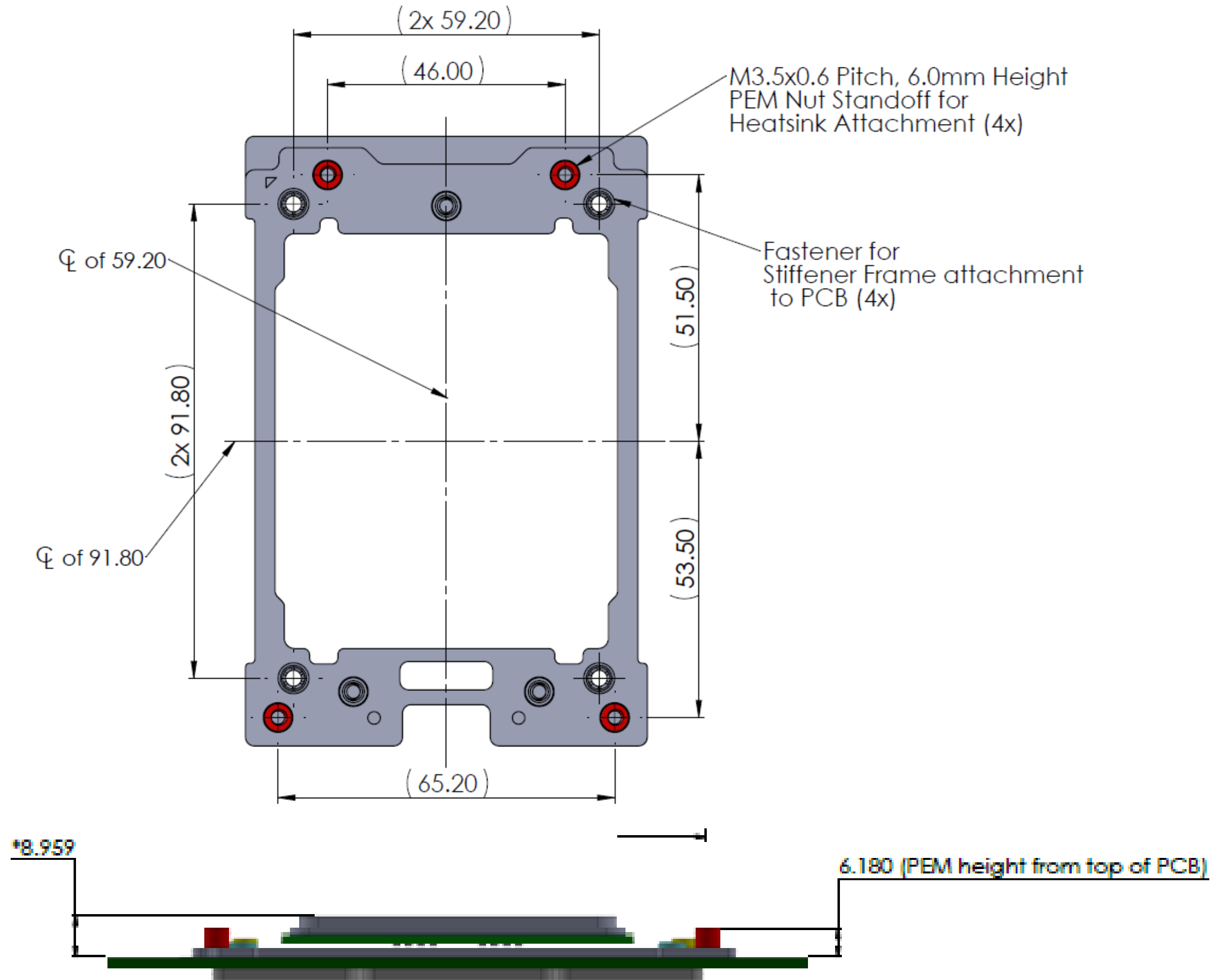


Figure 3. Heatsink Attachment Critical Dimensions on SAM Stiffener Frame (all dimensions in mm)

Chapter 3 Socket SP3 Processor Thermal Solution Design

This chapter describes the thermal solution design requirements, motherboard component-height restrictions, and reference design heatsinks for systems based on Socket SP3 processors.

3.1 Motherboard Component-Height Restrictions

The reference heatsinks are designed to fit within the keepout zone for Socket SP3, as shown in Figure 4.

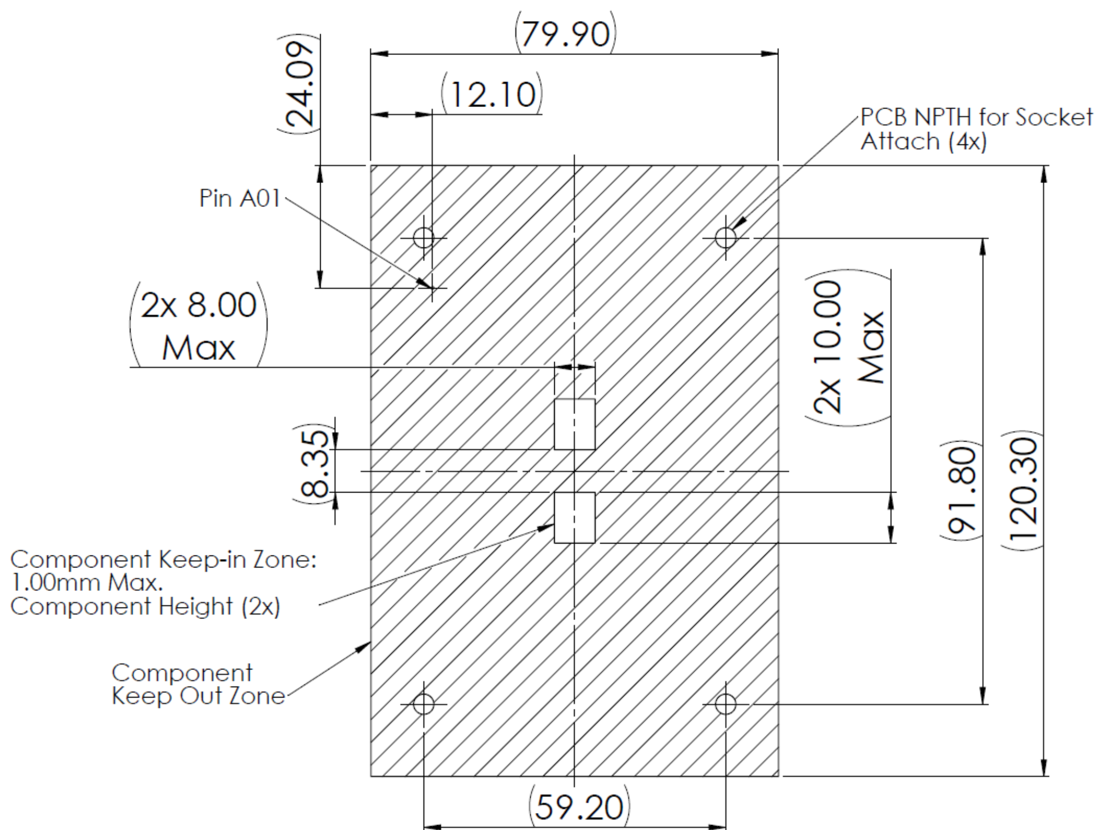


Figure 4. Motherboard Keepout Zone and Maximum Allowable Component Heights for SP3 Processor Heatsinks

3.2 Heatsink Design Requirements

The requirements for the heatsinks for Socket SP3 processors are shown in Table 1.

Table 1. Socket SP3 Processor Heatsink Design Requirements/Parameters

Symbol	Description	Infrastructure Group			
		A	B	C	D
TDP [W]	Thermal Design Power	180	155	120	225
T Case, max [°C]	Maximum Case Temperature	81	85	85	81
Fspring [lbf]	Spring Screw Force	75 +/- 15			
mass [g]	Mass of heatsink	<450			

Additional system level considerations should be given when developing thermal solution including temperature of air entering other system components and effects of air flow as a result of the socket thermal solution.