APPLICATION NOTE

AE-AN-SK-009-SK Series Board Stiffener Function and Capacitor Considerations

Purpose:

The purpose of this application note is to explain the importance of the Ardent board stiffener component of the SK Series™ Sockets. This document will also go into detail on how efforts in the PCB design up front are important to functionality and ultimately performance of the Amphenol Ardent Concepts socket when delivered.

The Technology:

The key to Amphenol Ardent's success lies in our patented core technology. Our contact sets provide the fastest, most electrically efficient connection thanks to the utilization of dual sided compression mount technology.

In our SK Series™ sockets these contacts are housed within the interposer portion of the socket. They are the electrical connection bridging the gap between the device under test and the PCB below. See *Figure 1* for a display of the different components of our socket.

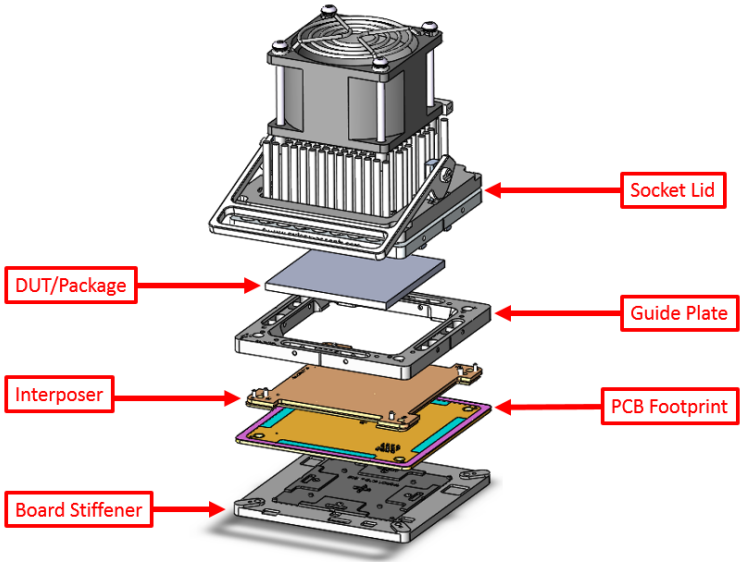

Figure 1

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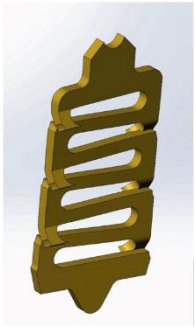
Amphenol Ardent's contacts have two states: free length and compressed. When compressed, the wire forms of the contact touch down on one another and, through this wiping action, initiates an electrical short. The electrical short created in this compressed state allows for shortest path possible for the signal to travel, resulting in industry-leading performance and speed.

RC Connect-R™		Spring Probe™	
Free	**Compressed**	**Free**	**Compressed**
			

Therefore, planarity of the board is vital when using Amphenol Ardent's SK series™ sockets. To ensure total compression of the contacts evenly over the area of a socket, tolerances and callouts of our footprints should be followed. If not, contacts may be unable to reach full compression and performance could suffer. In some cases, slightly decompressed contacts may not touch their designated pads, causing an open. To avoid loss of signal integrity and performance, we ask our customers to adhere to the callouts designated in all our footprint drawings.

Example:

Figure 2 (right) provides an example of a capacitor/component layout that hinders the ability of the Ardent Board Stiffener to function properly. The orange outlines represent the bottom PCB component layout of a customer's board. When overlaid on the board stiffener, there is noticeably not a lot of room for any of the support bosses of the stiffener to contact the PCB. This is especially true in the center of the socket where arguably the most support is needed.

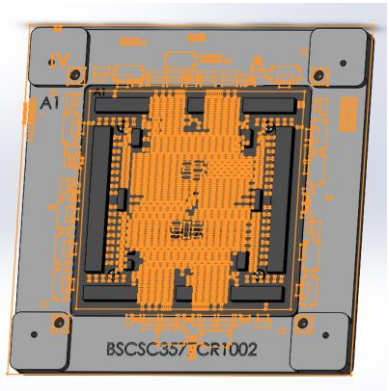


Figure 2

Figure 3 (below) is an example of a design catered to a customer's capacitor/component layout. In red is a .dxf of the bottom of a PCB. The stiffener pad supports are marked by the white lines, and as you can see the supports are designed so that they do not overlap with any of the capacitors.

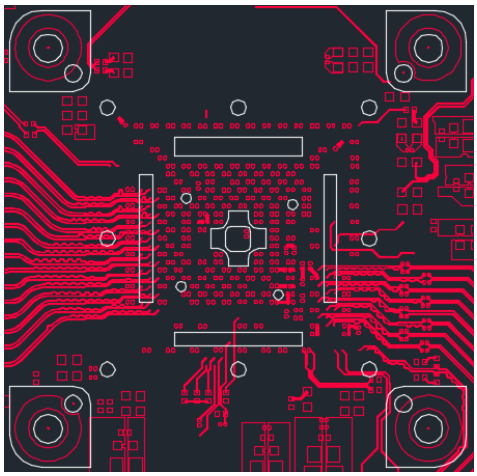


Figure 3

NOTE: All stiffeners are made of non-magnetic materials, and the concern for electrical shorts is a non-issue.

Supports are evenly spaced around the board with a solid center post acting as the anchor of the design. While the supports don't need to be this symmetrical, being able to spread the supports of the stiffener evenly under the package footprint is key to keeping the board rigid during testing.

Ideal Capacitor Layout:

We understand capacitors are important in high speed environments, but when switching occurs at a high-speed, noise is generated from the charging and discharging of capacitors. This can lead to problems up to and including complete circuit failures. Bypass capacitors store charge released to the power line when transient voltage spikes occur.

When laying out capacitors it is important to leave space not only for the bosses of the stiffener, but also the solder overflow that can occur. We recommend .030" [0.76mm] worth of separation between the supports and capacitors. See *Figure 4* for sketch of a proper distance between capacitor and support:

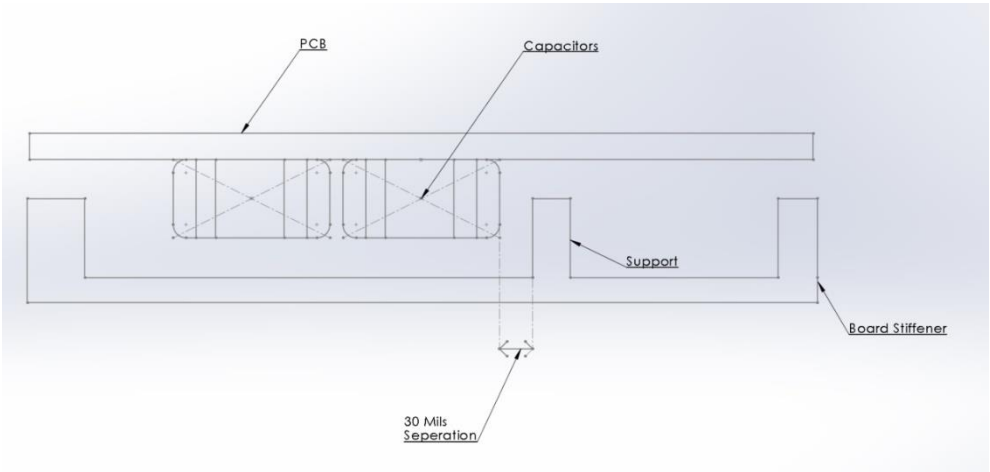


Figure 4

APPLICATION NOTE

Application Note Summary:

When designing boards in preparation for an Amphenol Ardent Concepts SK series™ socket, utilizing correct capacitor and component layout will best allow for seamless integration of the socket.

Ideal Capacitor Layout for board stiffener applications include the following:

- Leaving gaps in components so the supports of the board stiffener can touch down on the bottom of the PCB to help rigidity
- Evenly distributing those gaps for maximum distribution of support
- Leave room in the center of package to allow central support
- All stiffeners are made of non-magnetic materials, and the concern for electrical shorts is a non-issue
- We recommend .030" [0.76mm] to accommodate solder overflow.

When designing your Capacitor Layout, please include Ardent's Design Team in your deliberations. If you have any questions, please contact our skilled Application Engineers at support@ardentconcepts.com.

Who is Amphenol Ardent Concepts?

Amphenol Ardent Concepts is a leading designer and manufacturer of high performance multicoax and coaxial assemblies, connectors, and sockets used in the development of next generation semiconductors and electronics systems. Our core technology is the smallest, fastest, most electrically efficient compression mount connector technology worldwide. As data rate requirements increase and devices and systems shrink, Ardent's products deliver superior signal integrity in a dense footprint that can be reusable across programs to maximize cost savings.