

# design Sockets and Adapters

# FAQs

FREQUENTLY ASKED QUESTIONS

**REMEMBER THE DAYS** when everything was in a DIP package? Big parts, easy to see, easily fixed by the soldering technician. Those glorious days are gone. Every component, shrunk smaller, to an eye-straining size. Chips have switched from pins to pads, saving space in the process. The complete electrical world is beyond the point of practical handling.

The jobs have remained the same—design it, fix it, upgrade it, test it. Entire printed circuit boards (PCBs) to host a single chip is a waste of resources. But now, every new semiconductor package can have a socket or adapter. Test quickly, on the fly, swap out, and do it again. High-bandwidth, high-power, low-noise, and adaptability are at the heart of today's product design requirements.

What's on the minds of engineers that deal with dynamic electrical product design?

**Q: What is the maximum bandwidth test socket available?**

**A:** Ironwood Electronics offers several "Silver Button" solutions that support bandwidths of up to 75GHz (@ -1db) for an array of socket mounts including BGA, QFN, LGA, and PoP for high-speed applications depending on the need. The Silver Button line features Ironwood Electronics' new GT elastomer technology that allows for increased bandwidth testing and is designed to put even compression on top of the IC, which aligns the solder balls into elastomer buttons that contain a silver particle, hence the name.

**Q: I have an IC going obsolete. Can you help in providing a temporary replacement?**

**A:** We defeat this issue with Package Conversion. The first would be a Simple Package Converter. Let's say a DIP



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or PGA chip is obsolete. The package converter would take the newer surface mount (SMT) package and give it a 1:1 pin mapping to the original DIP pinout. If the chip remains relatively the same, a Simple Package Converter will solve the problem.

Perhaps the chip in question was redesigned and re-spun, or you upgraded the device's central processor (CPU) or microcontroller (MCU). This is an area where a Package Conversion can take the new CPU/MCU and turn it into a drop-in solution. If the upgrade has a different pinout and passive support components, the Package Adapter can house all necessary components on the adapter PCB. From the mainboard's perspective, it will look like the original.

**Q: I have a high-bandwidth IC. Do the adapter/sockets you provide have interconnects that can handle the throughput?**

**A:** The short answer is yes, there are several platforms that handle high-bandwidth throughput on multiple levels, including GHz Elastomer Sockets, Silver Button Sockets, and Silver Particle Interconnect Sockets (and a host of others)—

each with their own capabilities and signal thresholds. The GT line features an array of silver buttons with an elastomer matrix that has incredibly low contact resistance with no mechanical coupling. This option offers the highest bandwidth up to 75GHz with custom support plate and added heat sink options.

The SG line features gold-plated wire with an elastomer substrate with low contact resistance for bandwidth applications of up to 30.5GHz. It also has an optimized contact force for a reliable connection without damaging PCBs and has a compression cycle in the thousands. The SM line features a silver-filled elastomer that can handle bandwidth up to 40GHz and up. These sockets offer the industry's smallest footprint and are compatible with alternate socket technologies as well. The only question would be, what socket do you need for your application? (For a list of Ironwood sockets and specs, visit [http://www.ironwoodelectronics.com/catalog/Content/Drawings/Contact\\_technologies\\_summary.pdf](http://www.ironwoodelectronics.com/catalog/Content/Drawings/Contact_technologies_summary.pdf).)

**Q: What kind of signal integrity can I expect?**

**A:** With high-speed ICs dominating the market, the issue of signal integrity and electrical noise becomes an important factor. Ironwood's elastomer interconnect technology for Zero Insertion Force (ZIF) sockets provide a low-signal loss up to >40GHz. The sockets go through extensive signal-integrity simulations to garner active predictive models for high-speed (GHz) interconnects. For example, Computer Simulation Technology's CST Microwave Studio was used to simulate the electrical performance of the Silver Button platform, which has a polyimide substrate. Several values were applied,

including Silver Button conductivity and polyimide dielectric loss, which results in -1db at 75GHz. This was interpreted as 90% of the signal passed through the GT elastomer interconnect medium with only a 10% loss.

**Q: Do you support high-power devices?**

**A:** High-power draw is still common, despite miniaturization, especially in high-frequency devices. Heat, from the high-power coursing through the chip onboard, is dissipated through the elastomer (spring-like membrane at the base of the socket via a group of pads). Alternatively, Pogo Pins, spring-loaded pins at the base of the socket, could also be used. Both have a dual purpose of making electrical contact with the chip as well as acting like a heat sink.

For example, the new Silver Button Sockets are designed to dissipate several watts (of heat) with the standard aluminum heat sink. This socket can handle over 75 GHz, which could get fairly hot. With a custom heat sink, up to 100W dissipation is possible. In the GHz socket lines, the heat-sink options are quite popular.

**Q: I need a custom piece and some design engineering in the process.**

**Do you build custom designs?**

**A:** Custom is our specialty. You imagine it, we can build it. In fact, you do not even have to imagine it—we just need a description of the application, and we are off to lab.

Why build a product before you build your products? We have you covered: board-to-board interconnection; PLCC to BGA adapters; right-angle adapters; DIP customization; unique SMT; and even through-hole to solderless mounting. That's just a brief array of our capabilities. Up to 0.5mm pin grid arrays, 3 mil Line & Space, and impedance tuning are possible. Our experienced engineering department can make imagination into reality.

Our custom PCBs can be standard FR4 or flexible substrates with laser micro vias, shaped solder, embedded resistor, spring (Pogo) pin, and elastomer sockets, with a controlled impedance. Put in a request, you'll have that custom design within one week! ■

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