LGA vs. PGA CPU Socket: What's the Difference?

CPU sockets might not be high up on your list of criteria for choosing a computer. However, they do have a bearing on cost and performance, so understanding the difference between the two most common forms can be useful.

LGA and PGA sockets are the two common forms in question. Here, we lay out everything you need to know to make an educated decision on which of them is right for you.

What Is a CPU Socket?

A CPU socket marks the physical connection between your computer's motherboard and the CPU. The CPU can be likened to the engine of a car. And just like a car engine has a bearing on a vehicle's performance, the CPU plays a large part in determining the speed and power of your computer.

To take the analogy further, a car gearbox is what feeds the power to the wheels. A CPU socket performs a similar function, it allows the processor power to be fed to your computer as demanded.

The genesis of the CPU socket in its modern form can be traced back to the original Intel 286 processor that kick-started the age of the PC. This used a 68-pin PGA socket, since then CPU sockets have changed hugely as computer architecture evolved.

Despite these changes, the PGA socket is still widely used. LGA sockets followed in the mid-nineties.

Let's have a look at both forms.

Land Grid Array (LGA) Sockets

LGA sockets are commonly, although not exclusively, associated with Intel processors. This is due to one of the main differences between Intel and AMD motherboards.

With LGA sockets the pins that connect with the processor are located on the motherboard. The processor is designed with corresponding "pads" that make contact with these pins.

The pads are often referred to as lands and are manufactured using gold to maximize conductivity. This type of socket allows for easier, and safer, installation of the processor. The process is as simple as sitting the processor on top of the slot and using a mechanism to hold it in place.

Pin Grid Array (PGA) Sockets

PGA sockets have been used in most AMD computers until very recently. They differ from LGA sockets as the pins are on the processor and not the motherboard. This is

more important than you may initially think. Not least because this makes them vulnerable during installation. More on this point a little later.

However, if done properly and with a little care they should just drop into the CPU socket. Once they are seated properly a locking lever is used to secure the processor. One thing to be careful of is that the locking lever is in the open position before you seat the processor.

Which Is Best: LGA or PGA CPU Socket?

There are pros and cons to both forms. But let's start with an Achilles heel that has always dogged the PGA CPU socket----namely the fragility of the pins.

I speak from experience here. Having built bespoke PCs commercially for over twenty years I can testify that it only takes one moment of ham-fistedness to turn an expensive CPU into a useless tangle of bent pins.

The following photo shows a common result of a careless attempt at installation. In this instance, some delicate tweezer work would likely rescue the processor, an exercise I performed a few times. But again, care is needed if you find yourself in this situation as the pins will easily snap.

If you remember to take extra care with PGA sockets, the installation is quick and simple. So, what other differences can sway your choice? Here are some of the other considerations:

- **Electrical Properties**: LGA sockets perform better thanks to better contact between the CPU and the socket. This can lower power consumption and improve performance.
- **Pin Density**: The pin density on LGA sockets tends to be higher. This allows for higher data transfer rates.
- **Cost**: This is harder to quantify as a high-end PGA will cost more than a low-end LGA, there are also different manufacturers to consider. But as a rule of thumb when comparing similar specs PGA CPUs are cheaper.
- **Durability**: LGA sockets are more durable. However, to a lesser degree, the pin vulnerability of PGA sockets is switched to the motherboard with the LGA format.

There isn't much to choose between the two, both formats have proven track records that stretch back decades. But with AMD's move to LGA sockets, PGA CPU sockets may fade out of fashion.

LGA vs. PGA: Is It a Consideration?

If you are just looking for the right PC at the right cost, this is probably not a deal breaker. However, if you are looking to custom-build a PC or upgrade a motherboard, then knowing your CPU sockets is useful information.

Some general advice that I always gave customers was to opt for LGA for high-end and gaming PCs. Anything requiring mid-to-low spec then both choices are fair game.