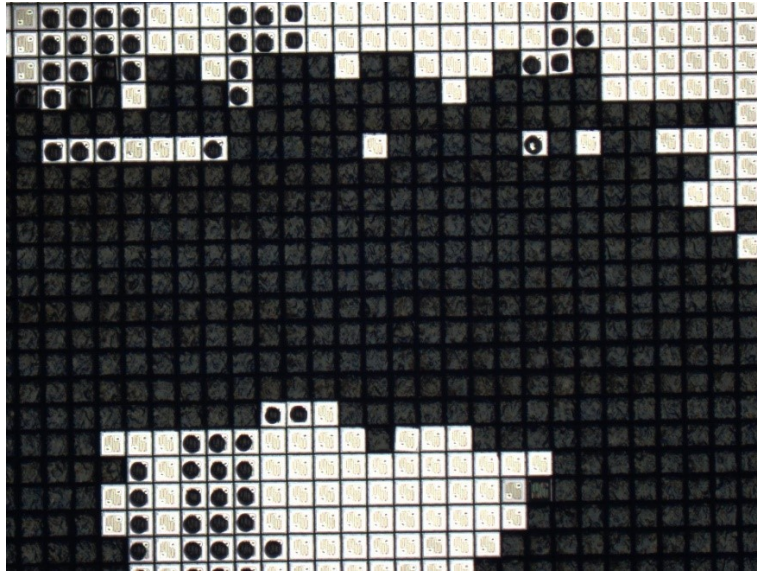


What are Bare Die Semiconductors?

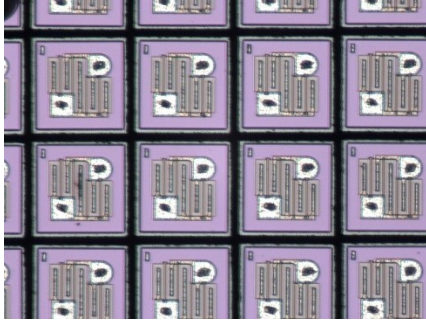
Bare die semiconductors are individual semiconductor chips that have been singulated or diced from a wafer and are not yet encased in protective housing by the manufacturer. Bare die are the base working circuitry of a semiconductor, and are also known as die, chip, unencapsulated die, bare chip etc... They are used in the telecommunications, automotive, aerospace, consumer electronics and medical fields just to name a few.



Greater flexibility for your design.

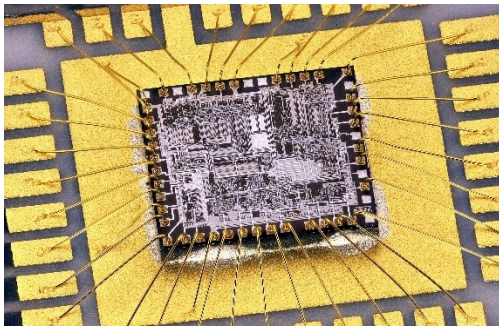
Bare die have several advantages over encapsulated semiconductors (hereafter referred to as packaged parts). Most engineers choose bare die when size or weight are the primary concern since bare die are much smaller and lighter than their packaged counterpart while still providing the same power and functionality. Their smaller footprint saves space on your circuit board allowing more flexibility in your design. These characteristics are of particular benefit in electric vehicle (EV) applications, advanced driver-

assistance systems (ADAS), and autonomous driving.

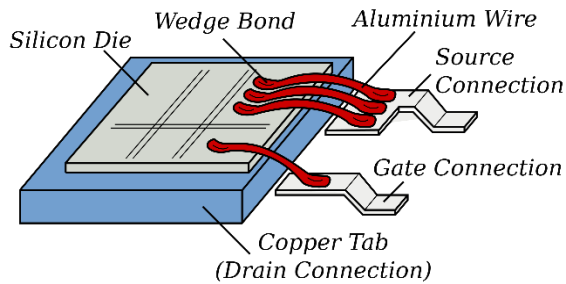


Greater reliability, efficiency and ruggedness is possible.

Bare die generally require fewer interconnects than packaged semiconductors which leads to more efficient and faster performance. Fewer interconnects also mean less things that can break so higher reliability is possible. Direct die attach allows your application to be assembled with high mechanical ruggedness and since you aren't limited by the encapsulated semiconductor's package material and means of construction there is also the potential for extreme thermal ruggedness.



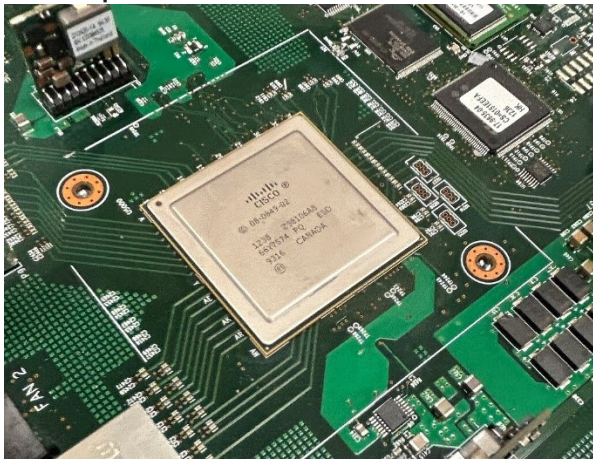
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Greater customization is possible.

Today's technology requires more customized electronics than ever before due to the proliferation of sectors like telecommunications, IoT (Internet of Things) and autonomous vehicles. Bare die allow hybrid manufacturers to integrate chips into unique configurations (ASICs), optimizing them for very specific applications or tasks. The growth of 5G, AI and autonomous systems are expected to further increase demand for ASICs.



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<https://commons.wikimedia.org/w/index.php?curid=134854440>)

The bottom line is that bare die allows hybrid circuit manufacturers to create bespoke devices that are perfectly suited for their specific needs from high speed communication equipment and rugged military applications to the

unique functionalities and configurations required in aerospace, medical and industrial equipment.

Things to consider.

Unfortunately, just because a semiconductor exists in packaged form this does not automatically mean it's going to be available in bare die form. We can help determine if a part is available from most manufacturers. The fact is most semiconductor manufacturers are adept at forecasting their own internal die requirements. This means for the rest of us, die procurement often entails large MOQ's and/or lead times. We specialize in sourcing the most needed device types from partners who value the small hybrid houses as much as the multimillion-dollar giants. This makes us adept at reducing your cost and lead time. We are authorized or franchised by many major manufacturers and our decades of experience mean we have access to die banks all over the world as well.

Another thing to be aware of is that bare die are not necessarily less expensive than their packaged counterpart. This is due to many factors which can vary on a case-by-case basis but most often is a result of the extra care required to handle bare die. Extreme care is required from the manufacturing stage to the specialized flow for testing, sorting and inspecting. Most die are made specifically for the manufacturer's own packaged part needs and aren't tested initially because the final packaged assembly will be tested in large volume. Almost all the die we supply have been 100% probed to databook specification at the wafer stage ensuring quality but ultimately requiring that specialized flow mentioned above which can increase cost and lead time. Should you require additional testing to your own particular electrical requirements or need the assurance of Lot Acceptance Tests to MIL standards; we can assist with that as well.

Die size can hurt as much as it helps.

The footprint friendly size of bare die is great for design flexibility but can make handling very difficult. Our staff is adept at handling these extremely small semiconductors and are accustomed to inspecting and repacking bare die. Whether you have a quantity per carrier requirement, or your automated assembly system requires a specific carrier to properly pick the die and place on your substrate, we can assist.

If you have any questions regarding bare die please call the experts at Sierra Components (775) 783-4940 or e-mail: SGunderson@sierracomp.com