Winner of the productronica innovation award 2019

Future Markets cluster: F&S BONDTEC Semiconductor – BAMFIT

Words of praise from Thilo Brückner, VDMA Productronics Association

The service life of heavy wire bonds in power semiconductors is difficult to estimate with accelerated test procedures. The widely used power cycling (PC) test recreates the load profile of a power component by using switching cycles, which produce a cyclic, controlled temperature increase at the bonding point. The vastly different thermal expansion of aluminum bonding wire and silicon substrate on the chip causes a cyclic voltage load at the bonding point, which over time leads to fatigue cracks on and in the bond interface. The downsides of this process are the large amounts of apparatus and above all the extensive amount of time required, in particular in the case of very reliable bonds: even in the case of a short cycle of just 5 seconds, the test can last up to almost 6 days until a failure is recorded after 100,000 cycles.

This is where F&S BONDTEC Semiconductor GmbH's BAMFIT Tester (BAMFIT = Bond Accelerated Mechanical Fatigue Interconnect Test) comes in which is revolutionizing the rapid test. Compared to previous methods, it enables extremely accelerated and fully automated service life tests to be conducted on heavy wire bonds. These are automated rapid tests which take just a few minutes. This disruptive innovative development means that reliability and service life tests can be carried out as part of the development and manufacturing processes. Compared to the usual power cycling test, this allows users to considerably reduce the amount of apparatus required and above all save a significant amount of time.

As a test procedure designed to support development and manufacturing processes, the aim is to be able to differentiate between different material and process variants. A semi-quantitative statement between process A vs process B, for example, would suffice if the test only lasts a few minutes.
This rapid test is precisely what the BAMFIT Tester performs. The basic principle is to use a special testing device to directly and mechanically recreate the voltage load on the bond foot

which is generated as a result of the different thermal expansions. The number of cycles undergone until the bond is removed is recorded at the end as a measure of quality.
We would like to take this opportunity to congratulate F&S BONDTEC Semiconductor GmbH on this disruptive innovative development. The technical features of the BAMFIT Tester will be showcased at productronica 2019.