Bonding Flip Chips on to Flexible Circuit Boards

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Image: FlipChip.jpg

As the result of a unique adhesion soldering process, Würth Elektronik is able to put flip chips on different circuit board substrates – even on flexible materials

***Niedernhall, January 2011* – Time and again, a major challenge lies in attaching integrated circuits (ICs) to highly integrated circuit board substrates in a space-saving manner. Würth Elektronik took this challenge on and found an ideal solution with the ESC (encapsulated solder connection) process. The chips are soldered and at the same time glued 'face-down" in their exact position. The ESC process is suitable for the most diverse substrates, be they fragile glass materials, FR4 or even flexible materials such as polyimide foils or LCP (liquid crystal polymer).**

Each substrate represents a separate challenge. Depending on the substrate, extremely tiny pitch distances of less than 100 µm can be realized. Using thermal compression bonding technology, the upside-down chip (flip chip) is set onto an anisotropic adhesive containing microscopic soldering particles. Briefly heating the adhesive causes the solder particles to melt and results in a true soldering connection between the chip's contacts and the substrate, which creates the electrical contact. The simultaneous hardening of the epoxy adhesive also sets the flip chip firmly into place. The entire process is called flip chip bonding. “An additional 'underfill process' is not required.

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In particular, the high exactness of placement and the finely dosed bonding force make it possible to process even extremely brittle substrates without any problems," explains Roland Schönholz, who is responsible for bonding technologies and Lasercavity at Würth Elektronik in Schopfheim, Germany.

At first glance, it seems contradictory to place relatively brittle ICs on flexible circuit boards. The ESC process, however, masters this challenge as well. The right chips are the prerequisite for successful bonding of the flip chips. These chips should have gold stud bumps, galvanic bumps or similar means of contact to serve as contacts. Würth Elektronik is able to manufacture the gold bumps itself for small amounts of individual ICs or also for small runs.

The ESC process gives the user great latitude in selecting the correct substrate – anything is possible, from brittle to flexible. The decisive factor, however, is that the final surface on the substrate can be soldered. "We are able to demonstrate that we have experience working with all common surfaces such as chemically applied silver, chemically applied zinc, ENIG (electroless nickel immersion gold) or ASIG (autocatalytic silver immersion gold)," says Roland Schönholz, "because numerous tests have already proven the reliability of the new construction and connection technology." In addition, flip chip bonding has already been proven in real life in connection with the innovative Lasercavity method, which Würth Elektronik is pioneering. With the bonding of flip chips, the circuit board specialist is continuing its

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technological leadership and enables users to further miniaturize its products and to achieve a maximum of integration while maintaining reliable functionality.

Caption

Würth Elektronik's unique ESC process enables flip chip bonding on the most varied of substrates, even on flexible materials such as polyimide films and LCPs (liquid crystal polymers).

About Würth Elektronik Circuit Board Technology (CBT)

Würth Elektronik is the leading PCB manufacturer in Europe, producing a wide spectrum of PCBs - from standard technologies through to pioneering system solutions - at manufacturing plants in Niedernhall, Rot am See and Schopfheim. The PCB specialist delivers application specific solutions in all technologies and is a driving force behind new technical innovations, for example, in the field of embedded active and passive components through Lasercavity and FLATcomp. The extensive PCB portfolio ranges from double sided PCBs and multilayers in all conventional technologies through to technically demanding PCBs such as HDI, flex-rigid and polymer technologies

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