Inside iCoupler® Technology: Multi-Die Packaging

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iCoupler digital isolation products utilize industry standard surface mount packages that incorporate unique design features in order to meet stringent safety requirements. The need for isolation within the package requires the use of multiple dies with a specially designed lead frames that creates two or more ground references that are galvanically isolated from one another. The lead frame design, therefore, is a key factor to meet regulatory safety requirements.

While most standard surface mount semiconductor packages contain a single large paddle, iCoupler products require that the paddle be split into isolated paddles. Lead frame designers look carefully at the split paddle gaps for both electrical and manufacturing considerations. ADI’s package design and assembly experience has developed creative approaches to enable the use of industry standard assembly materials and processes.

With the exception of the split nature of the paddle, all other aspects of package design and assembly are fairly conventional, resulting in a highly reliable product at the lowest possible cost.

To create connections between the chips, iCoupler products use standard wire bonding techniques and innovative assembly tooling to secure the components during manufacturing. To give the highest level of reliability, industry standard low stress wire bonding techniques are employed. To ensure robust manufacturing capability and high yield, detailed process design-of-experiments are carried out and process control techniques are created and implemented.

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In addition, all materials are selected based on the requirements of regulatory agencies such as UL, CSA, VDE and TUV. All this results in a finished product that looks just like any typical integrated circuit, with surface mount packaging that is compatible with standard board assembly production process; however, the resulting iCoupler products also provide world-class galvanic isolation.