

MULTI-CHIP BALL GRID ARRAY IC PACKAGES**Abstract**

The specification describes a high density IC BGA package in which one or more IC chips are wire bonded to a BGA substrate in a conventional fashion and the BGA substrate is solder ball bonded to a printed wiring board. The standoff between the BGA substrate and the printed wiring board to which it is attached provides a BGA gap which, according to the invention, accommodates one or more IC chips flip-chip bonded to the underside of the BGA substrate. The recognition that state of the art IC chips, especially chips that are thinned, can easily fit into the BGA gap makes practical this efficient use of the BGA gap. The approach of the invention also marries wire bond technology with high packing density flip-chip assembly to produce a low cost, high reliability, state of the art IC package.

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