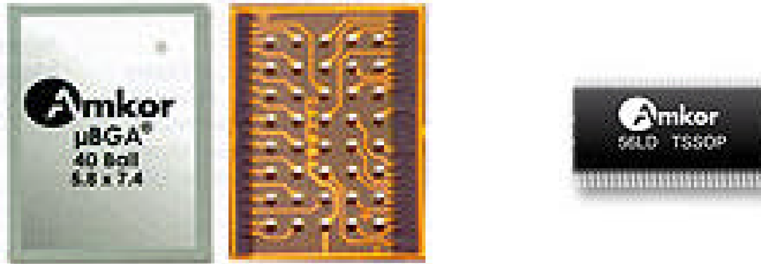
J*MAR PRECISION SYSTEMS, INC.

Application Note

IC Packaging



Introduction

Packaging bridges the gap between silicon chips and the substrate, today sub-micron feature sizes at the die level is driving package feature sizes down to the design rule levels of early silicon transistors. At the same time, electronic equipment designers are shrinking their products, increasing complexity, setting higher expectations for performance, and focusing strongly on reducing cost. To meet these demands, packaging technology must deliver higher lead counts, reduced pitch, reduced footprint, provide overall volume reduction and be cost effective. Packaging bridges the gap between silicon chips and the substrate. Critical dimensional parameters of each package must be kept under tight SPC control, otherwise performance and functionality of the end product is at risk.

The Measurement Need

Depending on the type of package used, there are certain 2D and 3D critical measurements that are required to ensure quality and robust products at the end-of-line. For ball-grid-array packaging (FPGA, BGA, µBGA) some 2D critical measurements include ball placement and ball diameter, since these values determine whether the "balled" chip will make proper electrical contact with the bond pads. One very important 3D measurement that is necessary to ensure proper seating of the package is the co-planarity of the BGA. Packaging of chips into lead frames is also another popular format, especially with low profile RF and telecommunication products. This process involves the mounting of the chip face-up onto the lead frame and then subsequently wire bonding the IC to the lead frame. Measurements that are important during this process include wire bond height and die rotation.

Plastic Packages (BGA, TSOP)	Lead Frame
Ball or Lead Co-planarity	Wireloop Height
Ball Placement	Wirebond Size
Ball Diameter	Wirebond Placement
Ball Height	Die Rotation/Placement
Package Width as Cut	Die Height

Table: Typical Important Measurement Parameters

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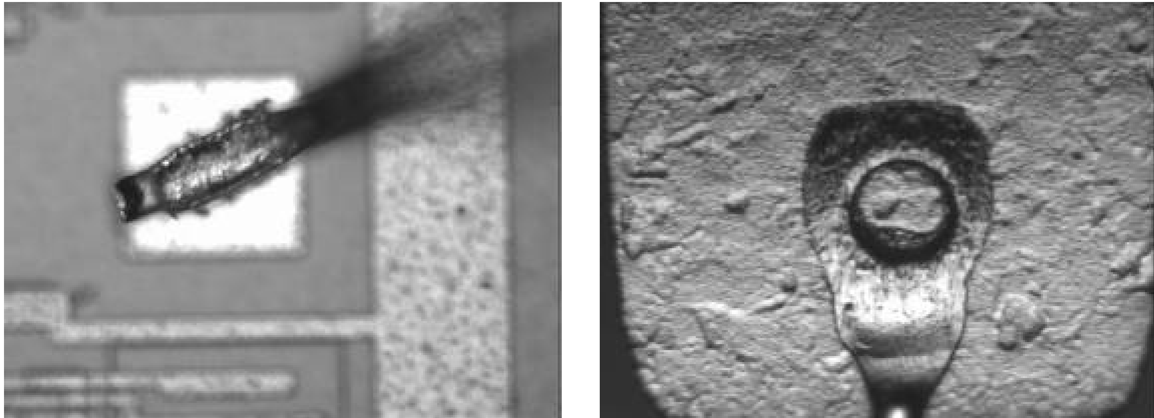

Fig. 1,2 Wedge and Ball Wirebonds

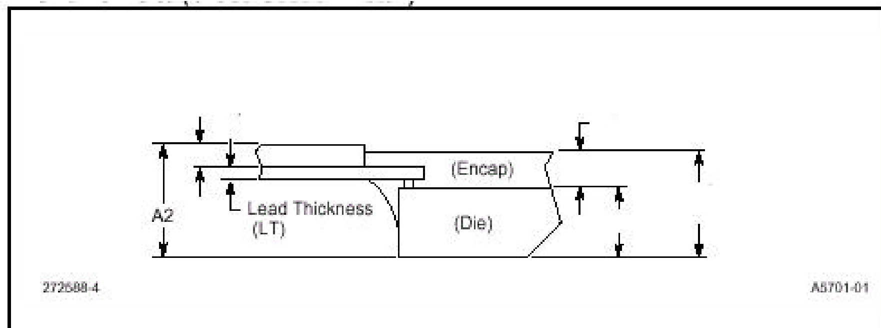

Fig. 3 Important Lead Frame Dimensions

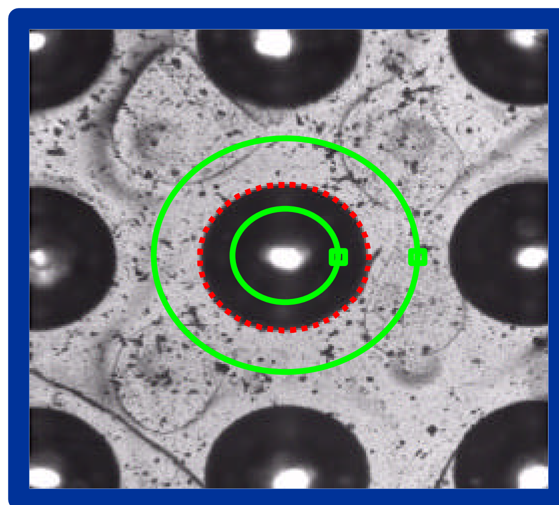

Fig. 4 Diameter Measurement of BGA

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