

Increasing system functionality, smaller form factors and reduced costs are competing demands. These competing demands place particular stress on interconnection technologies.

To help chip and package designers and manufacturers address these competing demands, an insulated wire bonding technology known as 'X-Wire™' Technology has been developed by Microbonds in co-operation with several leading companies such as Tanaka and ASM.

Traditionally, in order to avoid wire shorting, bare wire bonding interconnections have been largely limited to the perimeter of the chip in order to ensure that the bare wires do not touch. Additionally the bond pads and bare wire loops require valuable space in order to avoid the touching and shorting that can occur due to packaging and molding processes.

The cost and complexity of packaging keeps rising in part due to the complicated bonding processes, package layouts and compensating materials required to address the limitations of bare bonding wires.

Many of the industries technologies have been bearing the cost of these limitations- witness the variety of bare bonding wires, mold compounds, substrates, capillaries and equipment complexity all working together to address the limitations of bare bonding wires that cannot touch, cross or use the valuable inner territory of the die, or the area above the die due to the risk of shorting. In short, very valuable package space has been dominated by the limitations of bare bonding wire, and much industry effort has been expended to address the limitations of bare bonding wires in today's packaging configurations.

According to Charles J. Vath, ASM Pacific Technologies,

"...when you start using insulated wire, you reduce the criticality of wire clearance for both X and Y and Z. This will allow for even a different way of looking at wire bonding. I can go from here to there, and I can have another wire that goes from here to here, and they can touch. So that's going to be extremely critical for the future."

Achieving smaller geometries, shrinking form factors and increased functionality have all been slowed by the space and the collective efforts required to accommodate the limitations of bare bonding wires.

Insulated bonding wires enable core IC designs which can take full advantage of area array bonding wires to increase I/O counts per given die size, as well as enabling reduced die size while maintaining or even increasing I/O counts.

Advanced package designs enabled by insulated bonding wires include complex stacked die, die to die, thinner packaging form factors using low looping wires, and high frequency (RF) bond wires using closely placed ground/signal pairs. Insulated bonding wires also permits the use of long bonding wires.

Insulated bonding wires also enables the current trend toward thinner diameter gold wires to save material costs that cannot be passed on. Insulated bonding wires can also reduce substrate complexity and costs by allowing the insulated wires to cross above the die.

As early as the late 80's, several attempts to create an insulated bond wire were made. Previous attempts, which also involved the need for new bonding machines, proved unsuccessful in large part due to the unique and challenging process windows for 1st and 2nd bonds demanded by the wire bonding process.

X-Wire™ Technology is a unique coating process which electrically insulates gold and copper bonding wires.

X-Wire™ enables the trends toward tighter geometries, increased functionality, higher manufacturing yields, and better electrical price performance, all while sustaining and leveraging current investments in people, capital, equipment, and processes in the wire bond and assembly infrastructure.

X-Wire™ has been successfully tested by industry participants for first bond and second bond integrity, intermetallic formation, wire bonding yield and reliability.

Microbonds has executed its first license to permit X-Wire™ to be produced in volume with Tanaka Denshi, the global leader in gold bonding wires. Volume production from Tanaka is currently projected for Q4/06. Microbonds is also in discussions with other leading wire companies. Microbonds business model is to license its technology to the existing technology and market leaders and to continue to develop and enhance

its core competencies in chemistry and metallurgy. Existing R&D projects include insulated copper bonding wires.

Further, technology alliances with ASM Pacific, Kulicke & Soffa/AFW, MKE Electron, plasma, molding, capillary companies and others, have also been achieved in order to ensure that end customers are properly supported.

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