Low Temperature Direct Bond Technology for Reliable High Performance 2.5 and 3D Military and Space Electronics

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Military and space electronics have stringent reliability and performance requirements that can be challenging to meet for conventional packaging technologies. A low temperature direct bond technology has been developed to enable capability over and above that previously possible by reducing electrical and thermal parasitics and stress associated with coefficient of thermal expansion mismatch and eliminating underfills and intermetallics. This presentation will cover two variations of this technology and applications that have driven and are expected to continue driving adoption by a number of fabless, foundry, and IDM customers. These two variations, known as ZiBond® and DBI®, are distinguished by homogeneous insulating and >108/cm2 interconnect density hybrid bond capability, respectively. A low temperature bond strength stronger than silicon, in-situ scalable 3D interconnect that can eliminate or simplify TSV technology and low back end of line cost of ownership have combined to make these technologies of choice for image sensor and RF applications. The partitioning of 2D SoC designs into multi-node wafer stacked 3D designs with significant cost savings is expected to drive further adoption. In addition, implementation in die-to-wafer and die-to-die formats will convey benefits for 2.5D and die stacking applications, respectively. Furthermore, a 25um bondline capability and potential state of the art hermetic performance are expected to result in widespread implementation for a variety of MEMS applications including those requiring integration.