

Low Temperature Wafer Bonding and Fine Pitch 3D Interconnect

Enabling a wide range of high performance, scalable, cost effective IC solutions with ZiBond® & DBI® technologies

Room Temp Bonding

Scalable to <math><1\mu\text{m}</math> Pitch

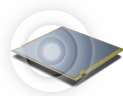
Up to 15x Higher Throughput

Wafer-to-Wafer



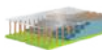
Image Sensor

- De-facto industry standard technology for backside illuminated (BSI) image sensor
- Very fine pitch 3D interconnect, scalable to pixel-level
- Eliminates need for Thru Silicon Vias (TSVs)



RF

- Reliably bonds dissimilar materials
- Improves thermal stability
- Enables RF CMOS transfer to a low cost, low RF loss substrate



3D NAND

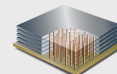
- Memory array and logic disaggregation - enables technology node optimization
- Yield enhancement
- High speed memory I/O interfaces



MEMS

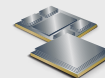
- Multi-function 3D integration
- Reliable hermetic seal
- Smaller footprint – eliminates pad limited die shrink

Die-to-Wafer



DRAM

- Faster, cooler, smaller
- Very fine pitch 3D interconnect
- Eliminates under bump metalization, microbumps, solder, and underfill



2.5D/3D Logic

- Increased memory to logic I/O and bandwidth
- Improves thermal performance
- Eliminates under bump metalization, microbumps, solder, and underfill

ZiBond® Technology

ZiBond technology is a low temperature homogeneous direct bonding solution that forms a strong bond between wafers or die with the same or different coefficients of thermal expansion (CTE). ZiBond technology is in high volume production today.

Features

Bond Interface Materials	SiO (TEOS, Thermal, Silane)	SiN (CVD or PECVD)	SiON (PECVD)
Substrates	Si, Glass, InP, GaAs, GaN, SiC, LiTaO ₃ , LiNbO ₃ , Sapphire		
Bonding Temperature	Room Temperature		
Anneal Temperature	75-300°C (application dependent)		
Equipment	Industry standard wafer alignment and bonding equipment		

DBI® Technology

Direct Bond Interconnect (DBI) technology is a low temperature hybrid direct bonding solution that allows wafers or die to be bonded with exceptionally fine pitch 3D electrical interconnect. DBI can also minimize the need for Thru Silicon Vias (TSVs). DBI technology is in high volume production today.

Features

3D Interconnect Metals	Cu, Ni
3D Interconnect Pitch	Scalable to <1µm pitch 1.6µm demonstrated 6µm in high volume production
Bond Interface Materials	Same dielectrics as ZiBond with integrated metal interconnect
Substrates	Same as ZiBond
Bonding Temperature	Room Temperature
Anneal Temperature	150-300°C (application dependent)
Equipment	Industry standard wafer alignment and bonding equipment

