

Challenges in Mechanical-Thermal Design of Flash Products

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Zoom Link: <https://ucmerced.zoom.us/j/81567405327>

Abstract

The amount of new data created each year is growing at an annual rate of 26% from 2015 to 2024. The installed base of NAND flash, one critical type of storage media, is expected to grow to 24% by 2024, up from 12% in 2019. In this talk, three topics will be covered to shed some light on the challenges in mechanical-thermal design of flash products.

1. Thin die NAND flash package assembly: to meet this insatiable demand for larger data storage capacity, Western Digital has been on the leading edge in both NAND flash fabrication process and multi-die stacking packaging technology. Die thickness has to be reduced further to stack more NAND memory dice in a package. Thin die assembly requires process and material innovation, especially in wire bonding process.
2. Board level reliability of NAND package: NAND usage is gaining momentum in more mission critical applications, such as automotive and data centers, which have more stringent reliability requirement. Board reliability enhancement needs a holistic approach, which should consider not only solder ball, but also metal and dielectric materials in substrate and PCB.
3. Thermal enhancement of solid state drive (SSD): read/write performance increase and SSD form factor shrink drive up the power density in SSDs. Thermal enhancement solutions at various levels are explored.

Biography



Dr. Ning Ye is Senior Director of Package Technology Development & Integration at Western Digital, where he manages Mechanical-Thermal Design Solutions Center of Excellence spanning all flash products as well as hard disk drive printed circuited board assembly. Prior to joining Western Digital in 2016 through the SanDisk acquisition, Dr. Ye received CEO award for his contribution in managing package design, qualification, and volume production ramp leading to successful launches of the world's highest capacity memory cards at the time: microSD 128GB, 200GB, and SD 512GB. He published a book chapter on Packaging Technologies, coauthored 7 journal papers and 15 conference papers, and has been granted 20 US patents. He is currently the Chair of Thermal/Mechanical Simulation & Characterization Committee, IEEE ECTC. Dr. Ye received his doctorate degree in Mechanical Engineering from University of California, Berkeley, master's degree in Solid Mechanics from Chinese Academy of Sciences, and bachelor's degree in Theoretical and Applied Mechanics from University of Science and Technology of China.