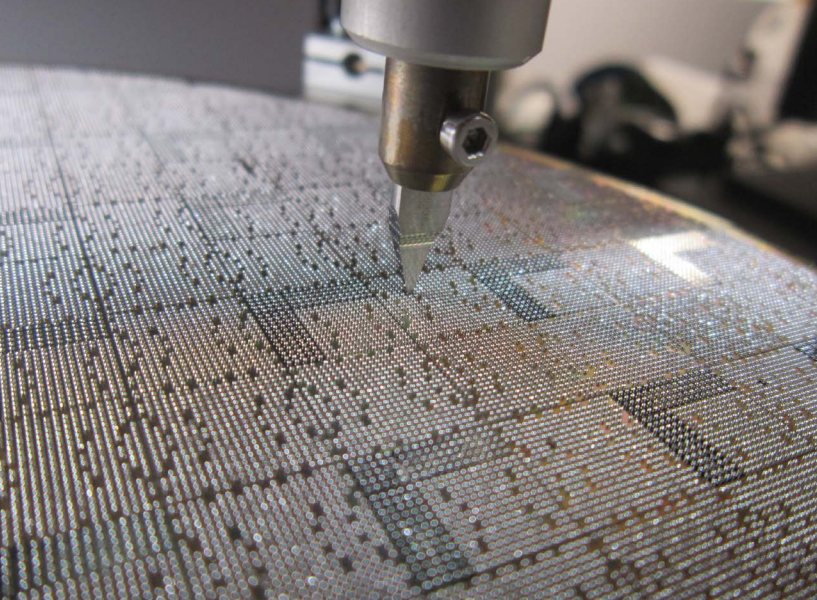




NORTHROP GRUMMAN MICROELECTRONICS CENTER

ADVANCED PACKAGING μ LINE, CENTRAL FLORIDA

PIONEERING PACKAGING

The μ -Line (Micro-Line) is a wafer post processing and test facility tailored for next generation defense microelectronics applications. This facility provides the nation with an assured source for the development and production of critical microelectronics packaging technologies. Products processed at the μ -Line will serve as essential building blocks to some of the world's most advanced radio frequency (RF) and electro-optic infrared (EO/IR) defense systems. Our advanced packaging process transforms the performance, efficiency and reliability of mission-critical microelectronics by seamlessly integrating numerous semiconductor chips, components and diverse materials into a single, highly interconnected package. Our cutting-edge techniques include 3D stacking, system-in-package (SiP), and wafer-level packaging, which allow for higher functionality and power in a smaller device.

NGMC SERVICES

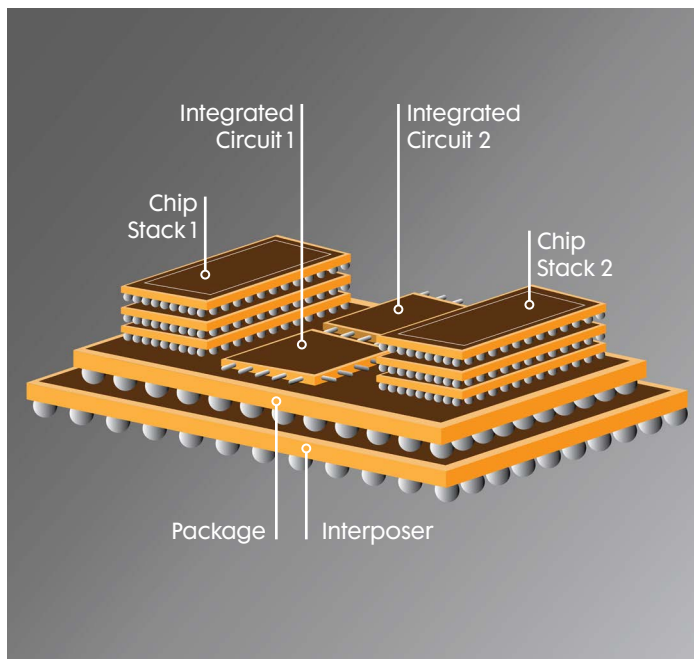
- Wafer size capability: 100mm, 150mm, 200mm and 300mm
- Bumping Process includes passivation, under bump metal, electroplating, solder sphere drop process.
- Bumping: lead, lead-free and copper pillar
- Dicing process includes: A dice before grind mechanical saw, thinning, laser die marking, die sort into waffle packs and tape & reel
- Metrology processing including whole wafer bump shear, 100% 2D/3D bump measurements as well as process controls in place for passivation and UBM layers

ADVANCED INSPECTION & METROLOGY

- Full wafer 2D/3D automated optical inspection for physical defect tracking and yield mapping
- Plating bath and solder alloy chemistry analysis, and wafer level bump shear for process and material quality control

WAFER TESTING

- Electrical probing/testing for unbumped wafers, bumped wafers, or bumped die up to 300 mm diameter
- Test yield tracking integrated with physical yield/defect mapping for overall die yield screening



TINY TECH, ANY MISSION

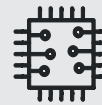
Northrop Grumman's microelectronics fuel more powerful next-generation systems to ensure America leads the world in military strength and innovation. Through an end-to-end process – all on U.S. soil – the company designs, manufactures, assembles and packages millions of microelectronics with unparalleled precision, ensuring a supply chain that's protected and sustainable to strengthen national defense infrastructure. Its two government accredited foundries and advanced packaging facilities support thousands of high-tech jobs while contributing to economic growth in local communities. Northrop Grumman stays on the leading edge of innovation by applying technological expertise to develop connected, secure and resilient solutions – supercharged by advanced microelectronics. Through the company's open-access foundries, located in California, Florida and Maryland, Northrop Grumman partners with defense and commercial customers to provide custom-tailored microelectronics solutions designed for critical, no-fail performance.



Over 30,000 Square Feet of Advanced Packaging and Test Space



U.S. Government Accredited, Secure Facilities



High Reliability and Space-Qualified Packaging Technologies

7Million

contributes to 7M chips delivered annually.