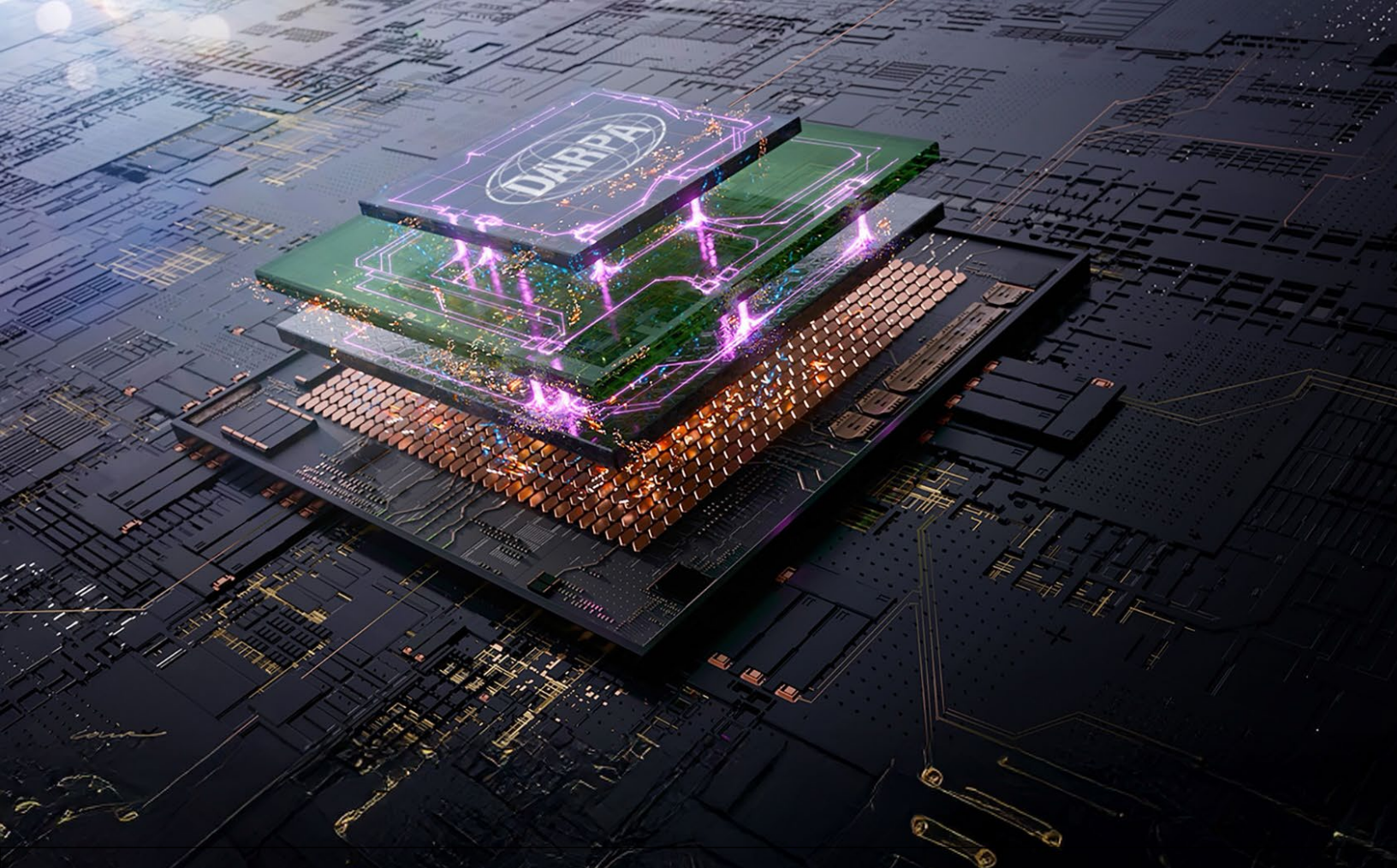




DARPA NGMM

Next-Generation Microelectronics Manufacturing

DARPA has repeatedly transformed U.S. national security through breakthrough technologies such as microprocessors, stealth, GPS, artificial intelligence, and autonomous systems. Now, the Next-Generation Microelectronics Manufacturing (NGMM) program is poised to deliver the next leap in warfighter capability.

NGMM enables a new generation of electronics that will keep the U.S. warfighter on the cutting edge of mission performance and ahead of the adversary. From electronics in your hand to edge computing in space, NGMM's multi-material 3D chips will outperform adversarial systems for decades to come.

NGMM is led by the Texas Institute for Electronics (TIE) research center and is building 3DHI microelectronics research, design, development and rapid prototyping facilities in Austin, Texas. TIE is now launching design tools and manufacturing processes capable of producing high-performance 3DHI microsystems to meet the demands of the industries and innovators supporting the U.S. military.



Contact us at ngmm@darpa.mil

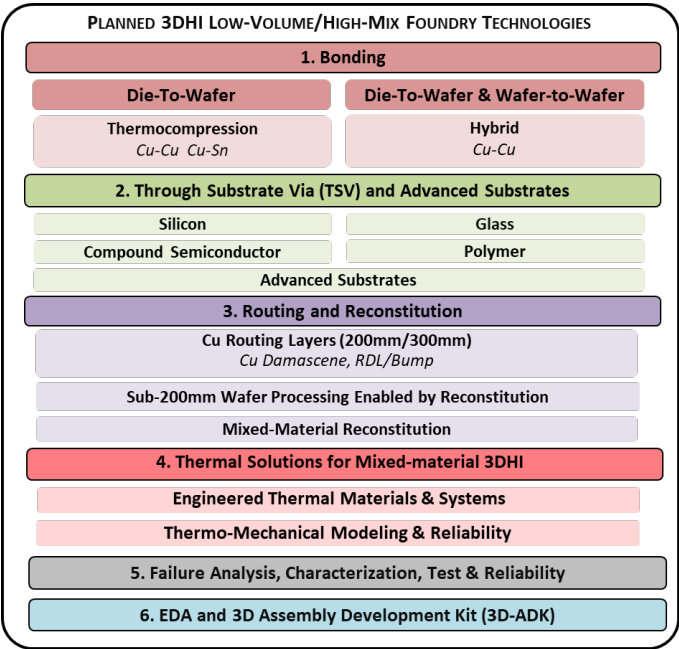


Figure 1. Summary of NGMM Multi-Material 3DHI Technologies

Summary of Design Challenges

- Reduce the size, weight, and power requirements for payloads while simultaneously increasing performance at the edge
- Increase lethality and mission success
- Assure warfighter dominance from undersea to outer space
- Reassert US dominance in microelectronics packaging technology

Specific NGMM-Enabled Capability

- Stacking enables 3D packaging with NGMM 3D-ADK of new and potentially existing chip designs
- Multi-material integration enables new design paradigms with orders of magnitude advantages in power, bandwidth, size, and efficiency
- NGMM ADK and design tools are available now for development, testing, and prototyping as process modules come online over the next 18 months

NGMM Fab Capabilities

EDA & Process Module Capabilities Release Schedule

	Silicon vs. Multi-material	3D-ADK v0.3 (Alpha)	3D-ADK v0.5 (Beta)	3D-ADK v0.7 (Qual)	3D-ADK v1.0 (Prod)	Process Module Availability
Group A: Fusion/HB, Dual Damascene, Cu RDL+Bumping, TCB, TSV Reveal	Silicon	Available Now	Late 2026	Early 2027	Late 2027	Process Modules brought-up between Q2, 2026 and Q4, 2027.
	Multi-material			Late 2027	2028	
Group B: Die/Wafer Reconstitution	Silicon	Available Now	Early 2027	Late 2027	2028	
	Multi-material					
Group C: TSV Formation	Silicon	Early 2027	Late 2027	2028	2028	Please contact TIE to explore further
	Multi-material	Late 2027	2028			

TIE is planning to release new EDA capabilities and process modules through 2027, focusing on expanding processes and materials. The EDA documentation outlines timelines for alpha, beta, qualification, and production releases for silicon and multi-material technologies alongside process module specifications and availability dates including:

- Process module rollout: Key process modules such as Dual Damascene, D2W and W2W bonding, TSV Reveal and Formation, Cu/PI RDL & μ Bump, TCB, and interposers. Scheduled availability between Q2 2026 and Q4 2027 with specific details on wafer sizes and feature sizes.
- EDA development timeline:
 - TIE's 3D-ADK has already been delivered to industry for early prototyping and validation.
 - Group A silicon capabilities will reach maturation by the second half of 2027, with earlier alpha and beta versions starting in 2026.
 - Group B and C silicon and multi-material capabilities have staggered releases extending into 2027 and beyond.