

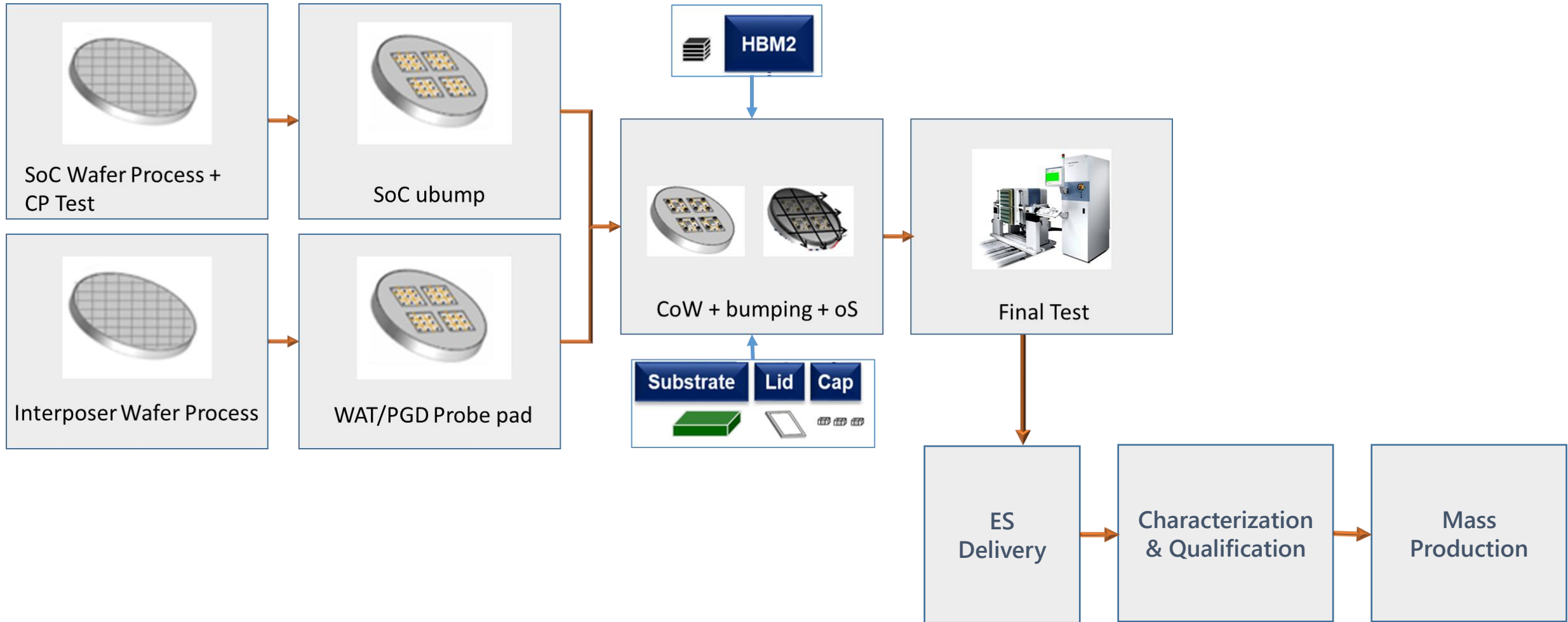


Alchip Technologies CoWoS Design Service

August 2020



CoWoS Manufacturing Service



- System Planning

- ① System architecture plan
- ② System power supply planning
- ③ Package ball assignments
- ④ Interposer die placement
- ⑤ SoC floorplan and IP/IO placement collaboration

- Physical Design

- ① SoC integration collaboration
- ② Interposer physical design
- ③ Package substrate design
- ④ HBM hardening and integration collaboration

- DFT Logic

- ① Test plan collaboration
- ② IP test logic collaboration

- Logic Verification

- ① SoC vs. interposer connection verification
- ② Interposer vs package connection verification
- ③ Power supply planning and connectivity

- Mechanical and Warpage Simulation

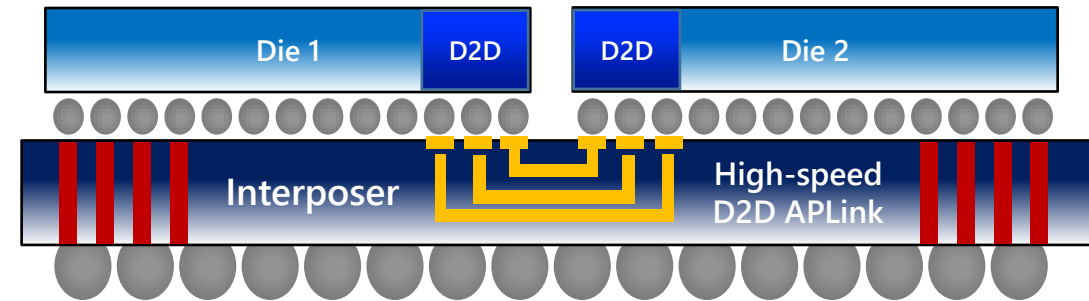
- ① CoW warpage simulation to meet TSMC CoWoS production process control
- ② Package warpage simulation to meet SMT yield and board level RA

CoWoS Production

- Testing and Yield Improvement
 - SoC CP1 testing for KGD (Known-good die)
 - Interposer/CoW PGD (partial known die) testing
 - Final test and yield improvement
- Characterization & Qualification/ORM
 - Device qualification
 - Package qualification
- Production Management
 - Logistic control: HBM2E/Cap/Lid/SBS
- RMA and FA Handling

Complete D2D IP (APLink)

Metrics	APLink 1.0	APLink 2.0	APLink 3.0
Process	N12	N7+	N5P
Line Rate (Gbps)	1.0	4.0	Under Development
Energy Efficiency (pJ/bit)	1.0	0.7	Under Development
Beachfront BW (Gbps/mm)	100 Tx 100 Rx	400 Tx 400 Rx	Under Development



- 5nm APLink 3.0 scheduled to tape out Dec. 2020
- Supports CoWoS and InFO_oS

Summary

- Alchip provides complete CoWoS 2.5D homogeneous and heterogeneous integration services.
- Alchip's 2.5D package IP portfolio includes Tier 1 HBM2/2E PHY/Controller and D2D vendors.
- Alchip has completed customer product HBM2 development.
- Several CoWoS HBM2E projects under development.



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