大量科技

TA LIANG

Precision Is What Turns Ambition into Reality

Advanced Technology → Execution → Enduring Impact

1980s
Speed & productivity

2000s
Control & repeatability

Today
Precision defines feasibility

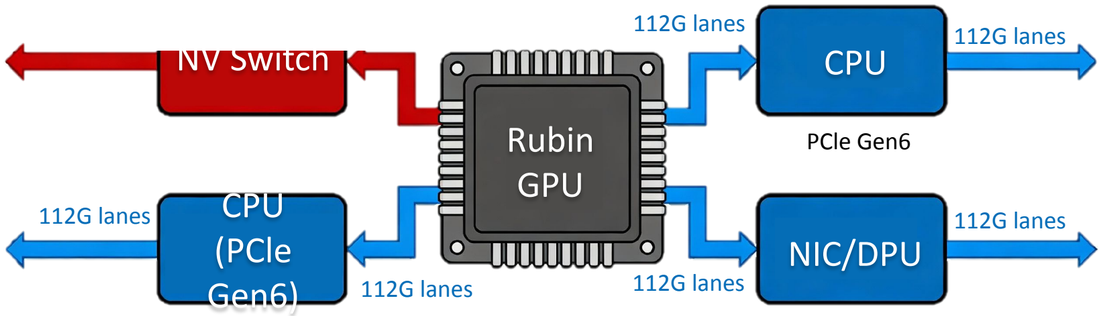
When we started in 1980, PCB manufacturing was relatively simple. Machines were built for single or double-sided boards, tolerances were wide, and productivity mattered more than precision.
As the industry moved into multilayer boards, machinery had to become more stable and repeatable. Alignment, depth control, and consistency started to matter — not occasionally, but every cycle.
Today, with advanced PCBs used in AI servers and high-performance computing, the role of machinery has fundamentally changed. Precision is no longer about quality improvement — it defines whether a design can be manufactured at all.
Looking back, the evolution of PCB machinery has always followed one direction: from speed, to control, and now to precision as a strategic requirement.

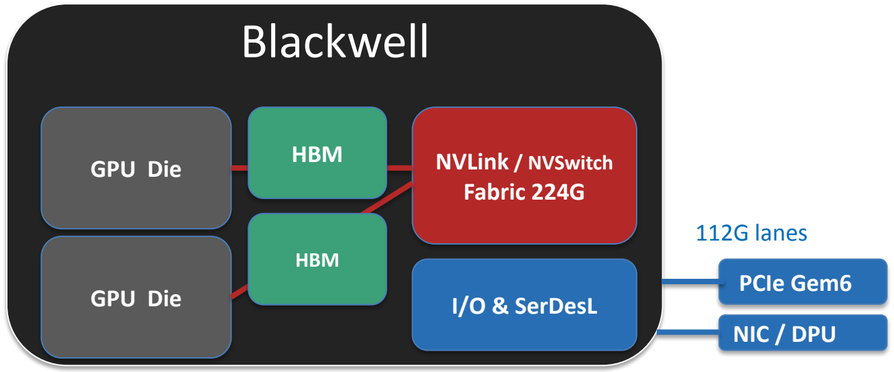
That perspective continues to guide how we think about the future, with that, I'll hand it back to our executive director, TJ Lin for further discussions.

Thanks for your attention today!

Rubin moves 224G on PCB

224G lanes on PCB

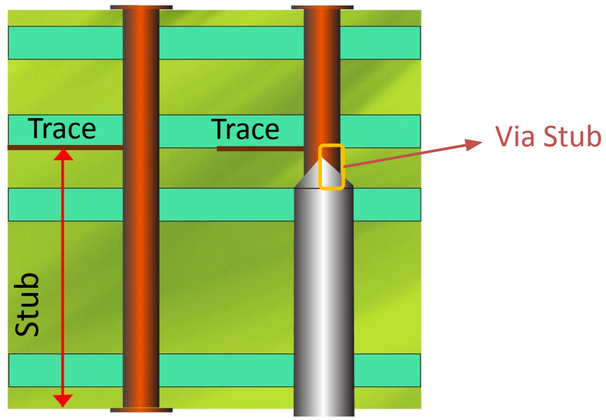




At 224G, the signal bandwidth is so wide that vias, pads, and small shape changes actively affect how the signal propagates.

Via stub is a small piece of leftover metal
At low speeds, the signal ignores it

Plated-Through-Holes
Back-drilling



±2 mil back-drilling becomes a physics-defined pass/fail threshold

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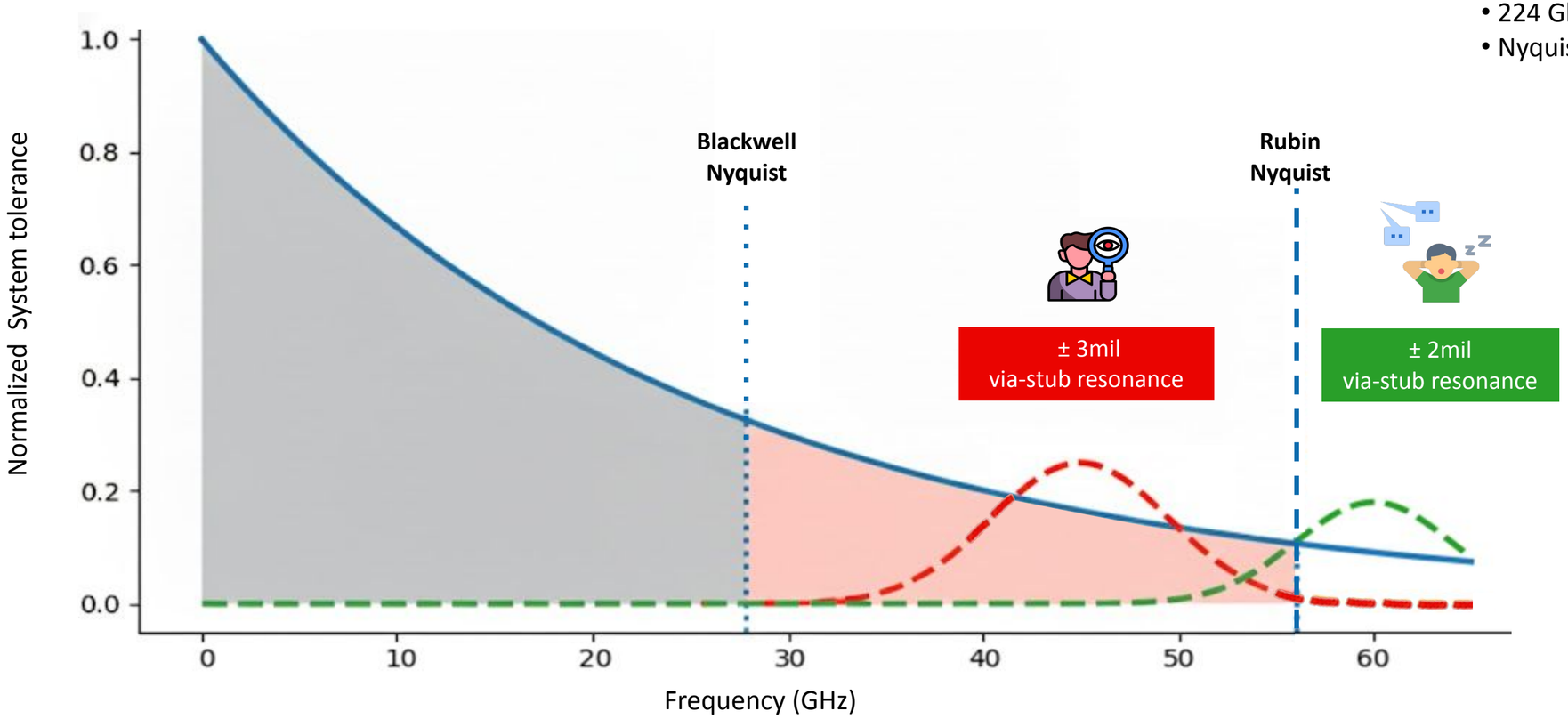
- Nyquist defines the frequency range where physical structures affect signal integrity
- Rubin Nyquist doubles-> via-stub resonance moves into-band

Note:
- PAM4 encodes two bits per symbol
- 224 Gbps -> 112 Gbaud
- Nyquist = half the symbol rate = 56 GHz



Deterministic depth is the new entry barrier

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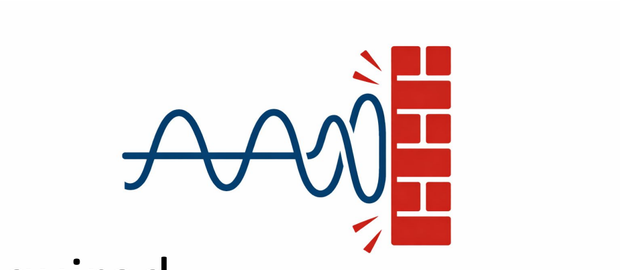
±2 mil is binary – pass or fail



Closed-loop measurement + execution required

Mechanical precision alone is insufficient

StubMapper™ is the only system that closes the physics loop

Replication requires synchronized control of sensing, motion, and depth intelligence

6-spindle drilling

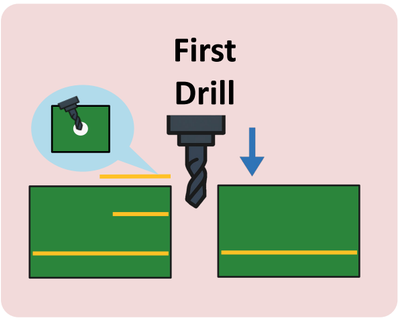
Scalable execution

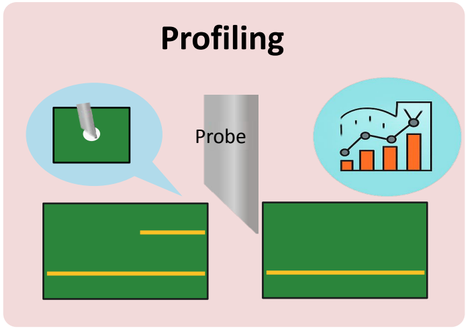
StubMapper ™

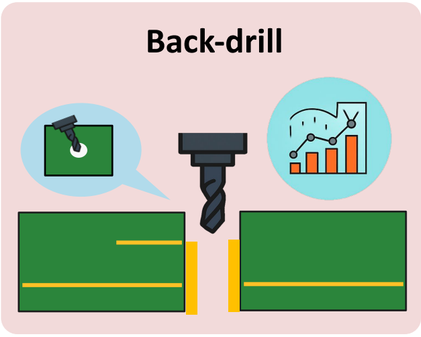
StubMapper™
Deterministic ±2 mil depth awareness

6-spindle CCD drilling

Consistency







Proprietary controller

Control logic, motion, and depth intelligence are vertically integrated

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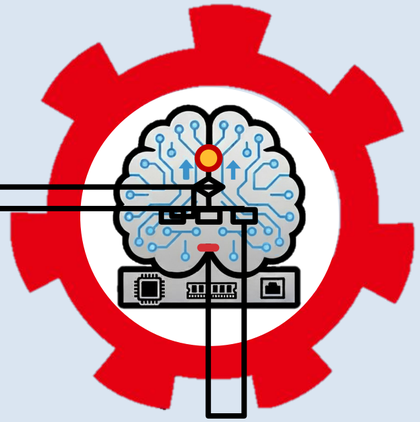
- Intelligence is invented
- Controller is proprietary



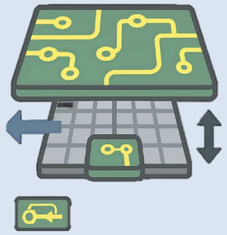
1980
Fouded

Hardware is sourced

2012
Vision alignment

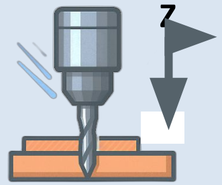
2018
Semiconductor BU

High-speed spindle

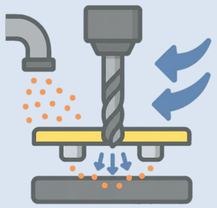


XY table

Chassis

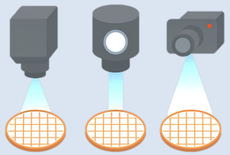


Depth control



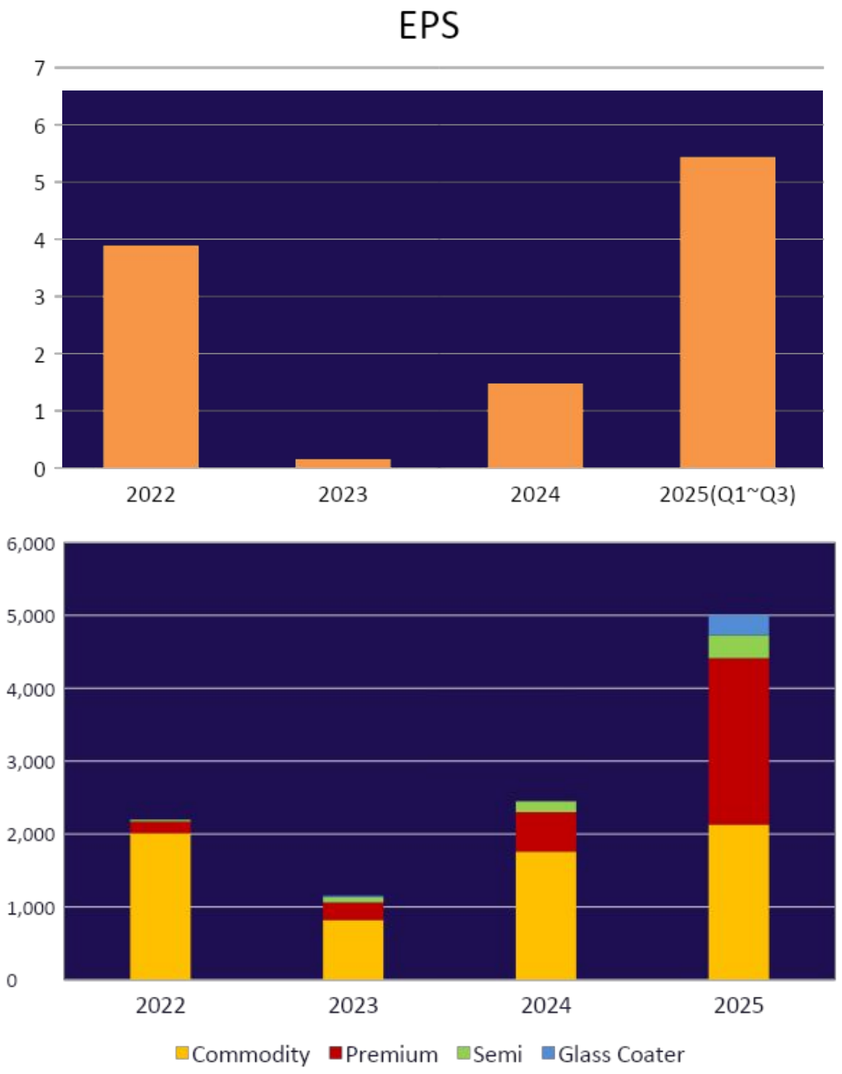
Dust & cooling

CCD

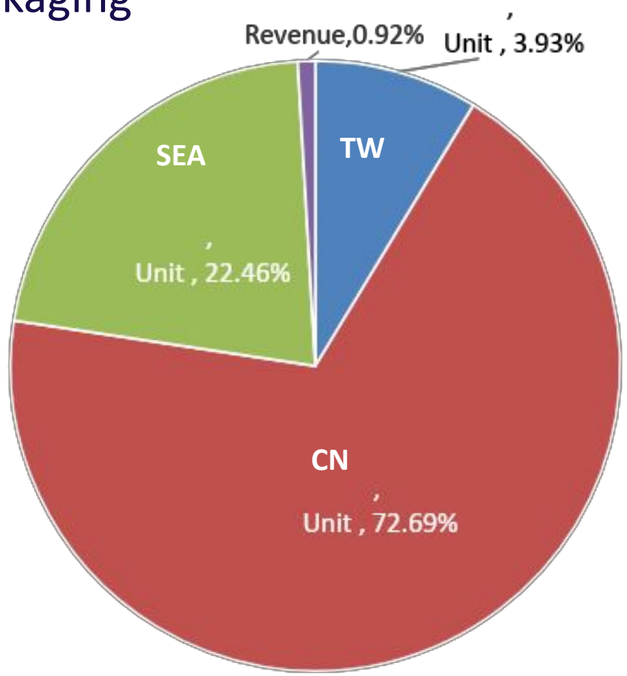


SENSORS

Precision equipment for physics-limited manufacturing



- Mass-volume provides scale & stability
  - Commodity PCB routing and drilling systems
- Strong growth driver
  - StubMapper™ + six-spindle drilling systems
- Accelerating with Adv. Packaging
  - AOI and metrology



Scalable expansion

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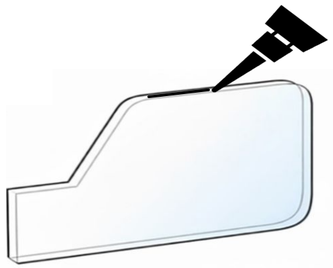
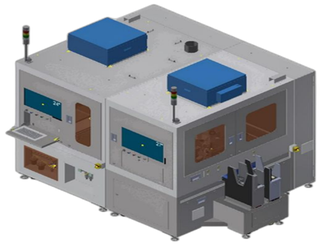
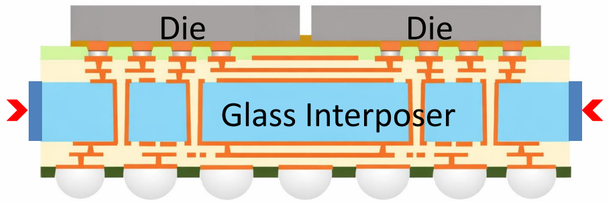
Early Production Adoption

Glass Edge Coater







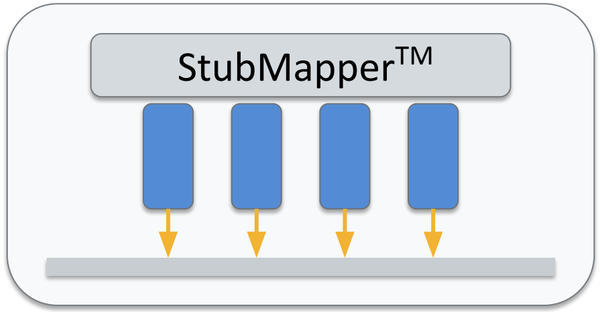
Stress supression

Blocks ambient light

In Pipeline

Multi-probe StubMapper™

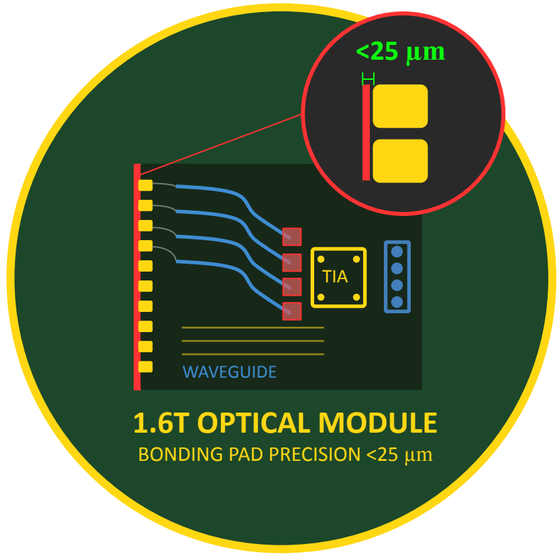
Quadruple TM speed



Planning

Precision router

1.6T optical module



Semiconductor Business Unit

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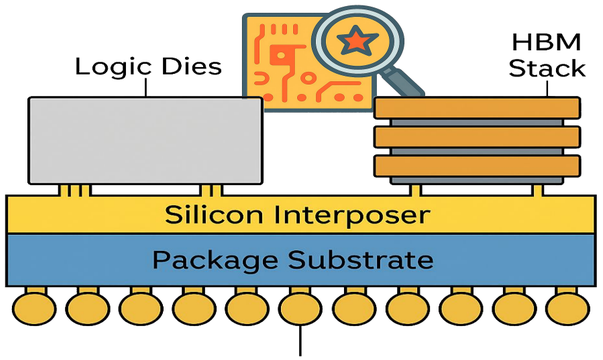
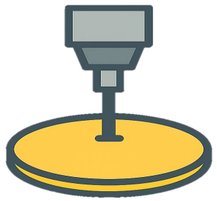
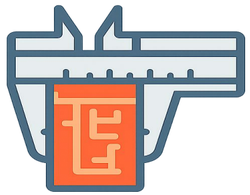
The same control-and-metrology discipline proven in PCB manufacturing is now validated at the most advanced foundry nodes



CoWoS





Product portfolio aligned with advanced packaging workflows

Revenue today. Expansion tomorrow. Next-gen platforms ahead

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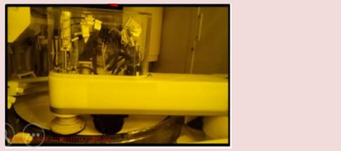
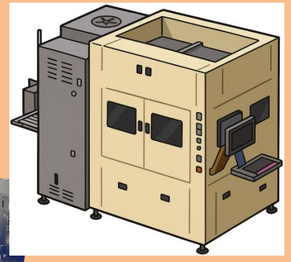
- Foundry-verified
- Template for OSAT scale-out
- Production line expansion imminent
- OSAT adoption at early stage

- In development
- Matches most advanced foundry nodes
- Revenue follows industry adoption curve





OS

- Flux Jetting AOI
- Die Bond AOI
- R2R AOI(FVI)
- Bonding Tool Metrology

CoW

- HBM Incoming AOI
- FORDL Cosmetic AOI
- Wafer Flux Jetting AOI
- Wafer Die Bond AOI
- Wafer Underfill AOI
- Wafer Edge Die AOI
- Wafer Molding AOI

SoIC

- CMP Pad Metrology
- Step-Height Metrology
- Wafer Edge Profile Metrology

FOPLP/CoPoS

- FOPLP Warpage Metrology
- Bond Shift_Edge Profile Metrology

Every critical CoWos step now has a TL measurement footprint

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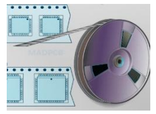
:Provided By TL Tech.

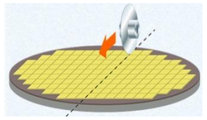
HBM

SoC ASIC

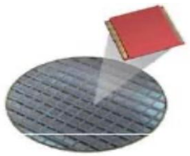
FORDL



Incoming AOI

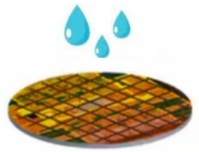


Wafer Saw



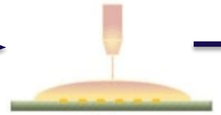
Wafer FC Bond

FC Bond AOI



Wafer Reflow

Cosmetic AOI/DUC/ Warpage Metrology

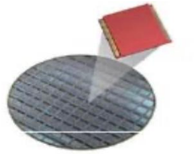


Wafer Flux Jetting

Flux Jetting AOI

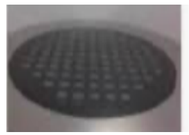
Wafer Underfill

Underfill AOI Fillet-height Metrology



Wafer Edge Die Bond

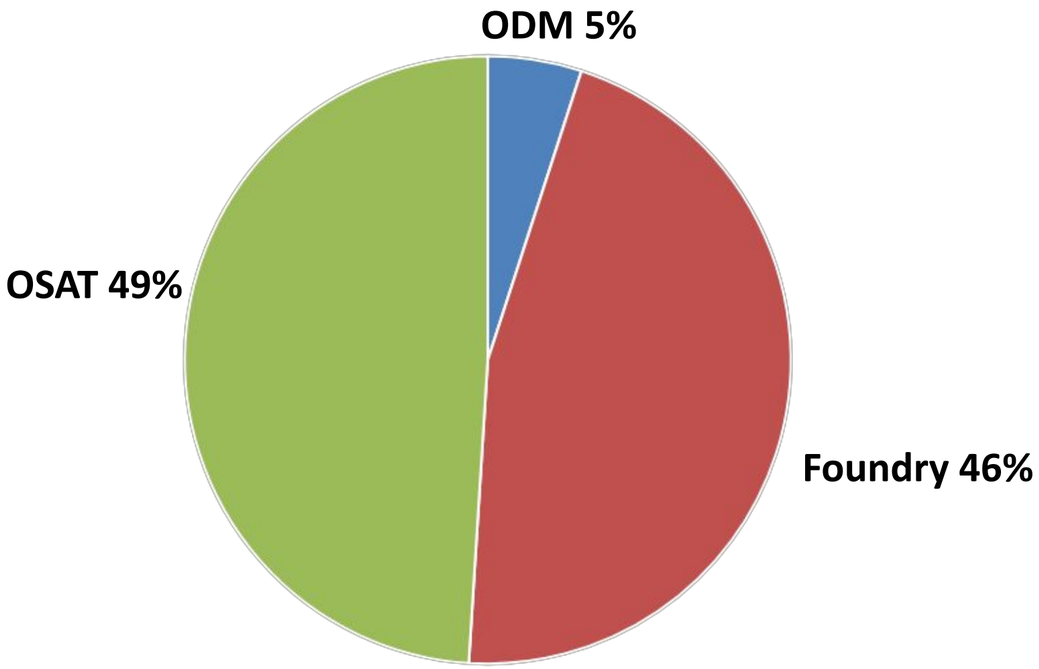
Edge Die AOI



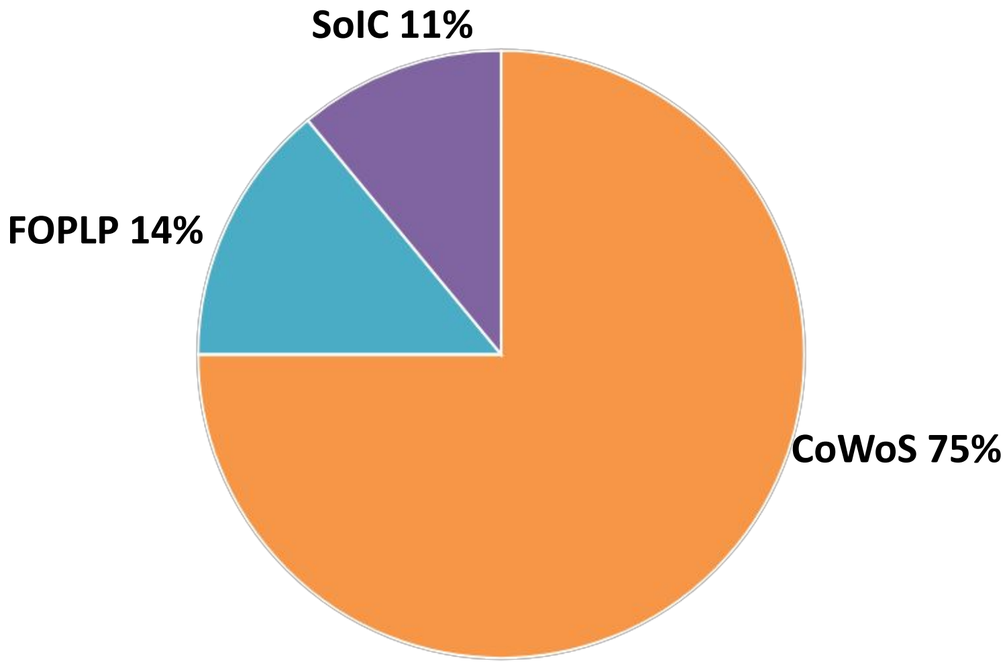
Wafer Molding

Molding AOI/ Thickness Metrology

Semiconductor BU revenue mix by customer segment



Customer



Technology

PCB competitive landscape under the new premium definition

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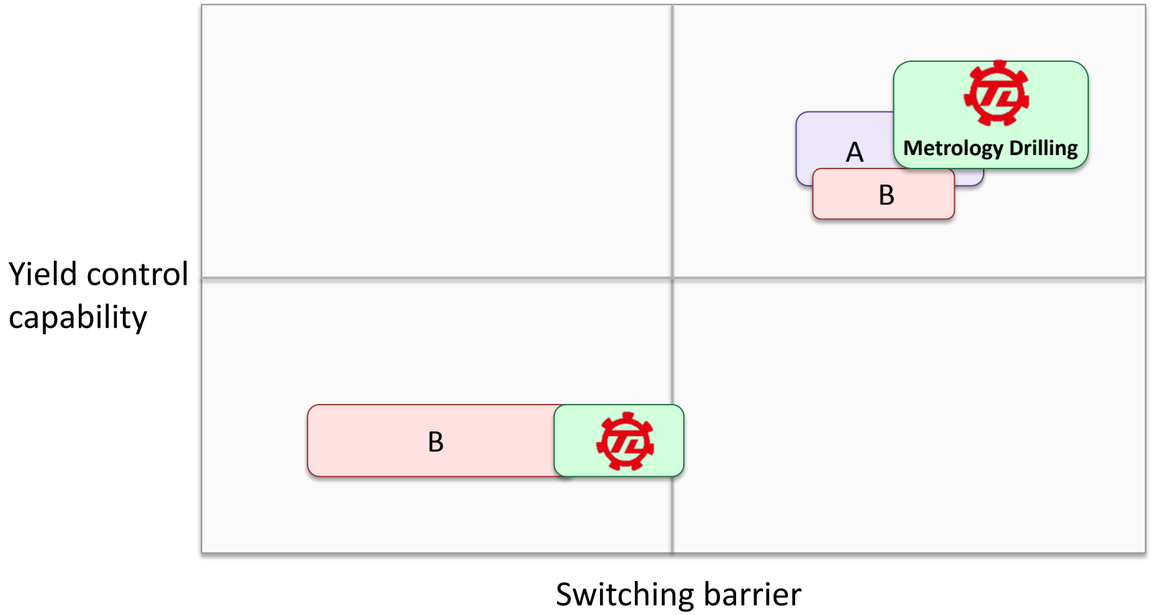
TL shifted premium definition
Yield-sensitive ⟶ Yield-controlled execution



Strategy and capacity allocation

- Outsource commodity products for steady growth
- Preserve internal capacity for high-demand premium systems
- Metrology-driven execution enables premium share gains

AI infrastructure permanently shifts manufacturing from scale-driven to physics-limited

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- Complexity-led growth
  - Value drive by complexity
- Precision -> Spindle counts
  - Rewards precision, control, and software
- AI/server boards drive CapEx
  - AI/Server boards consumes disproportionally capex of the routing/drilling systems
- High-end pricing power
  - Physics-limited supply improves pricing discipline