What next for Asian suppliers of test and burn-in sockets?

John West
Yole Group

TestConX 한국 Korea

Suwon ▪ October 29, 2024

YOLE Group

Test and burn-in socket suppliers play a critical role in a fast-changing semiconductor test ecosystem

Suppliers of test & burn-in sockets from China, Korea, Taiwan, and South-East Asia have outgrown the market over the past 10 years

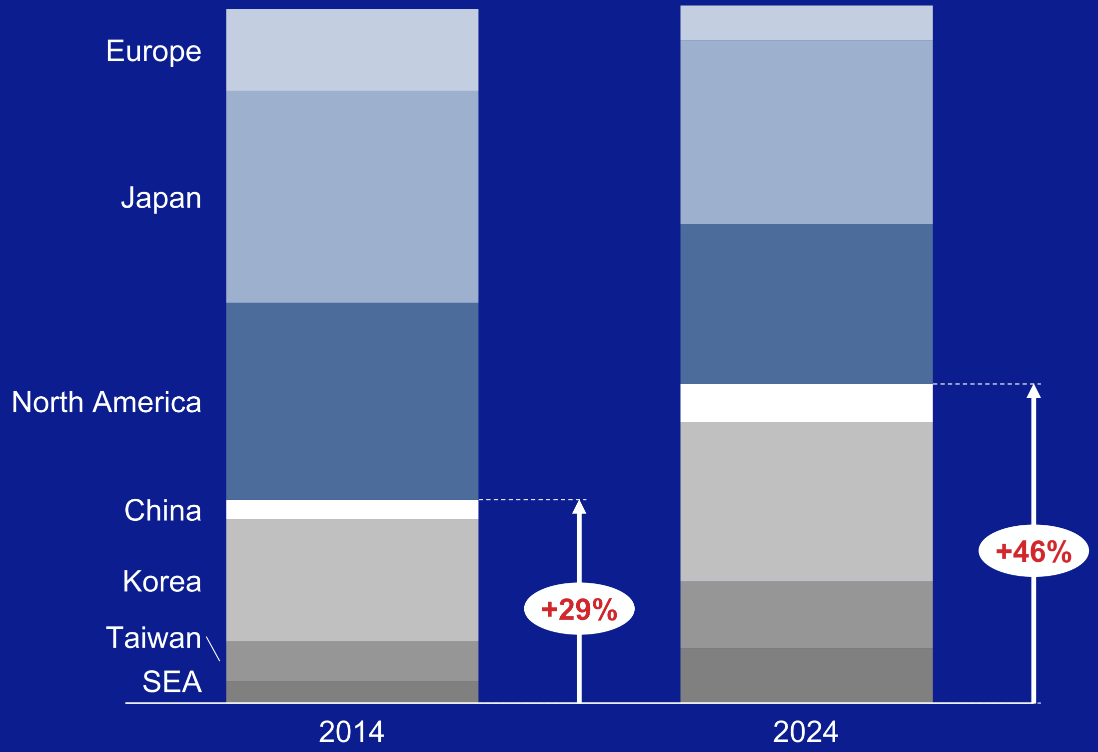
The market environment is changing and presents new challenges

New test solutions and higher performance sockets are required

How should suppliers respond to these changes?

Test and Burn-in Sockets by Region of Supplier HQ

As a % of Total Revenues

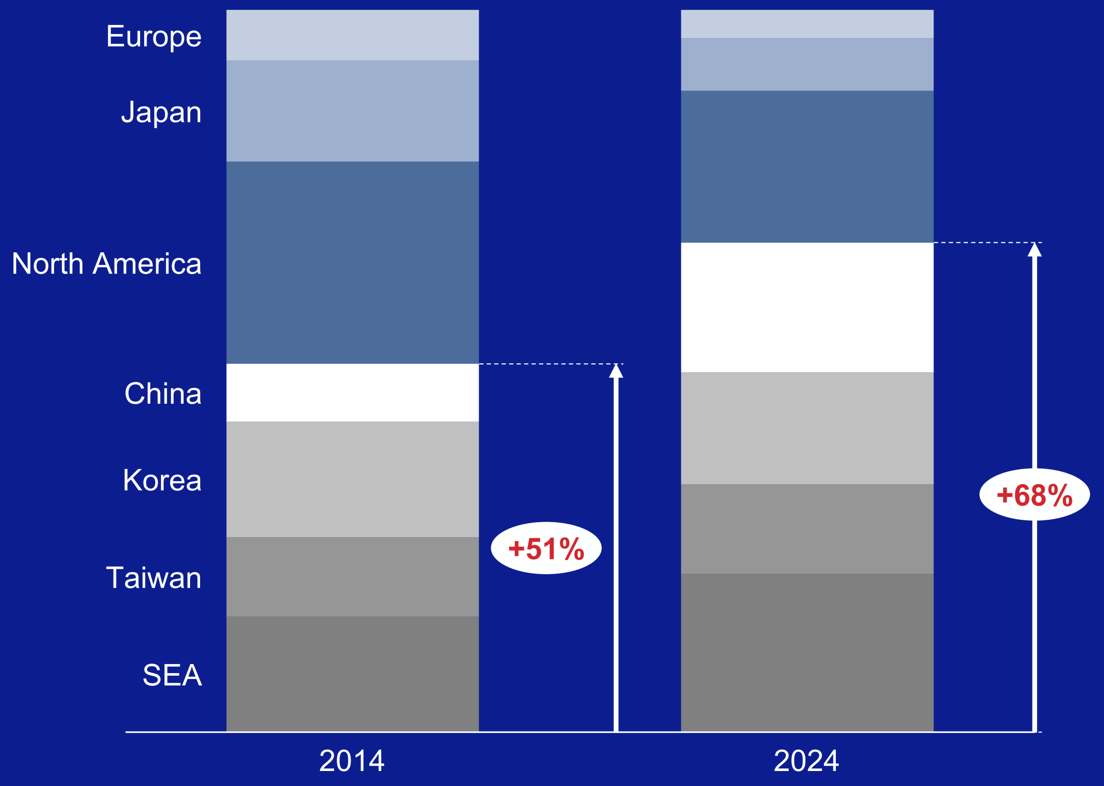


Suppliers from China, Korea, Taiwan and South-East Asia grew their share of the market from 29% in 2014 to 46% in 2024

Rate of share gain has slowed since 2021

Extrapolation of historical trends indicates the combined market share of suppliers from this group of regions will level off at 50% by 2029

Test and Burn-in Sockets by Region of Sale *



** Region of sale defined as region where the key purchasing decisions are made. This may not be the same as the region where the purchase order is placed*

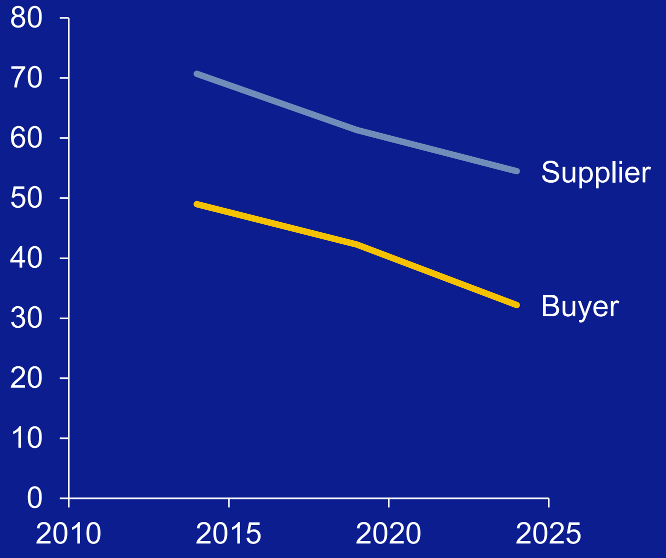
Shift in regional sales due to:

- Increased localisation of purchasing decisions
- Investments in final test facilities in Europe, Japan, and North America not keeping up with worldwide investments
- The Chips Acts in US, EU, and Japan
- Location of new advanced packaging facilities for high-performance devices

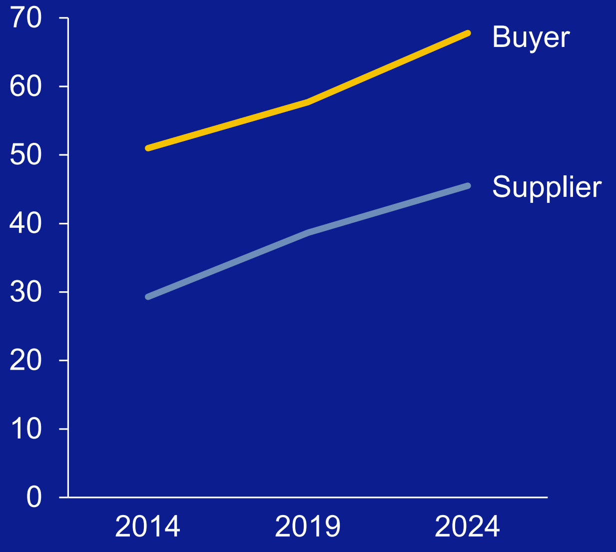
Test and Burn-in Sockets

Strong regional correlation between suppliers and buyers

Europe, Japan, North America as a % of Global Market



China, Korea, Taiwan, SEA as a % of Global Market



Buyers have a clear preference to buy local where possible

In general:

- European, Japanese and North American suppliers lead on performance
- Chinese, Korean, Taiwanese, & SEA suppliers lead on price

Outlook:

- Supplier share to level out at 50:50 by 2029
- Buyer share to stabilise at 70:30 in favour of CH, KR, TW, and SEA

TestConX한국 Korea

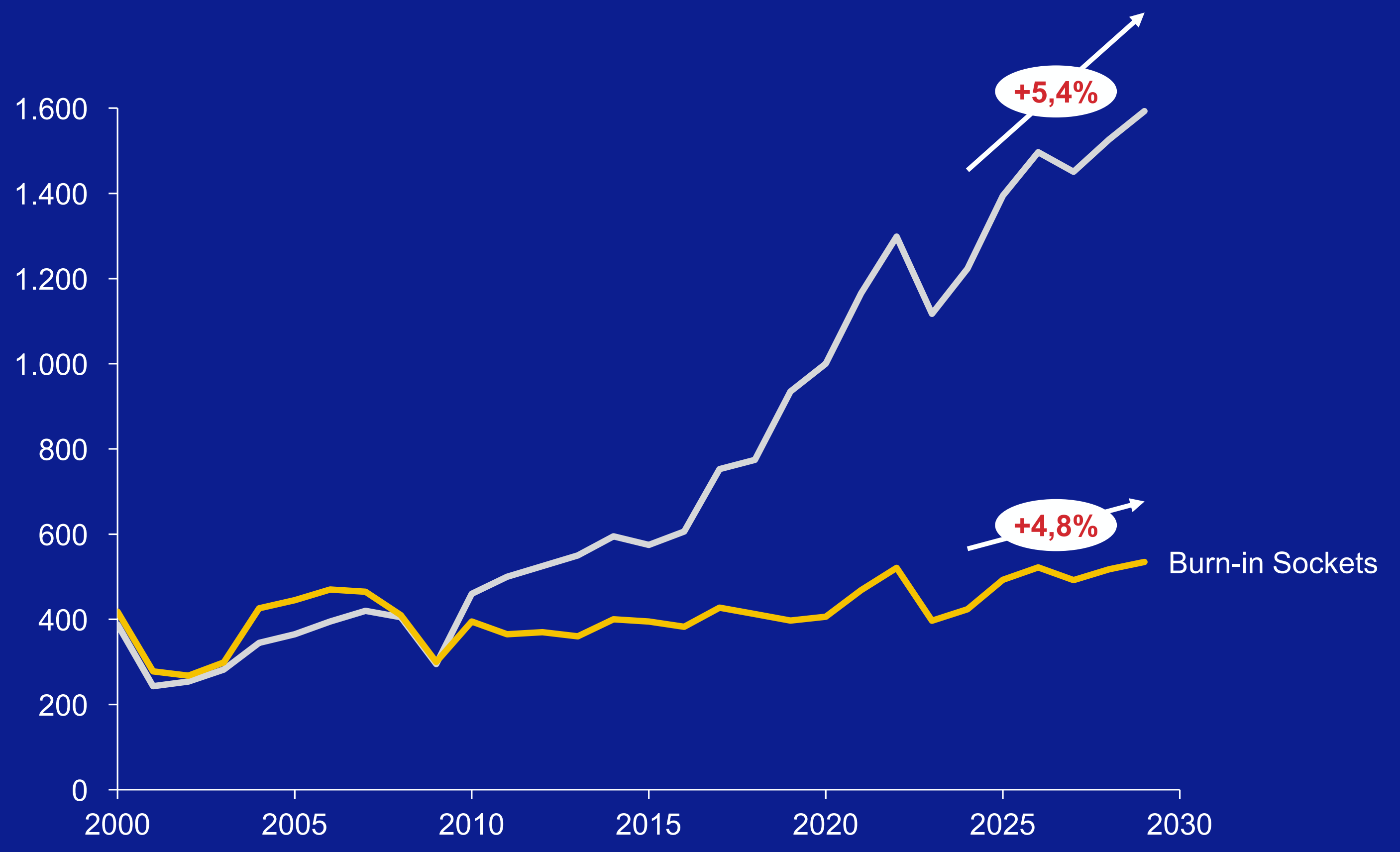
What next for Asian suppliers of test and burn-in sockets?

25th ANNIVERSARY SINCE 2000

Key Takeaways: Regional Trends

- Suppliers from China, Korea, Taiwan and SEA:
  - Gained market share over past 10 years from 29% to 46%
  - The rate of share gain is slowing and likely to peak at 50% share of global market
  - Suppliers from this region expected to grow in-line with overall market growth from 2029 onwards
- Sales to China and SEA continue to grow rapidly
- Locations of some new final test facilities will be affected by the various Chips Acts
- Strong correlation between suppliers and buyers within regions
- European, Japanese, and North American suppliers working hard to stay ahead on technology

Long-Term Evolution of Test & Burn-in Socket Sales, USDM



Test Sockets:

Point of inflection in 2016 due to longer test times, larger packages & higher pin counts, and increased use of System Level Test

Burn-in Sockets:

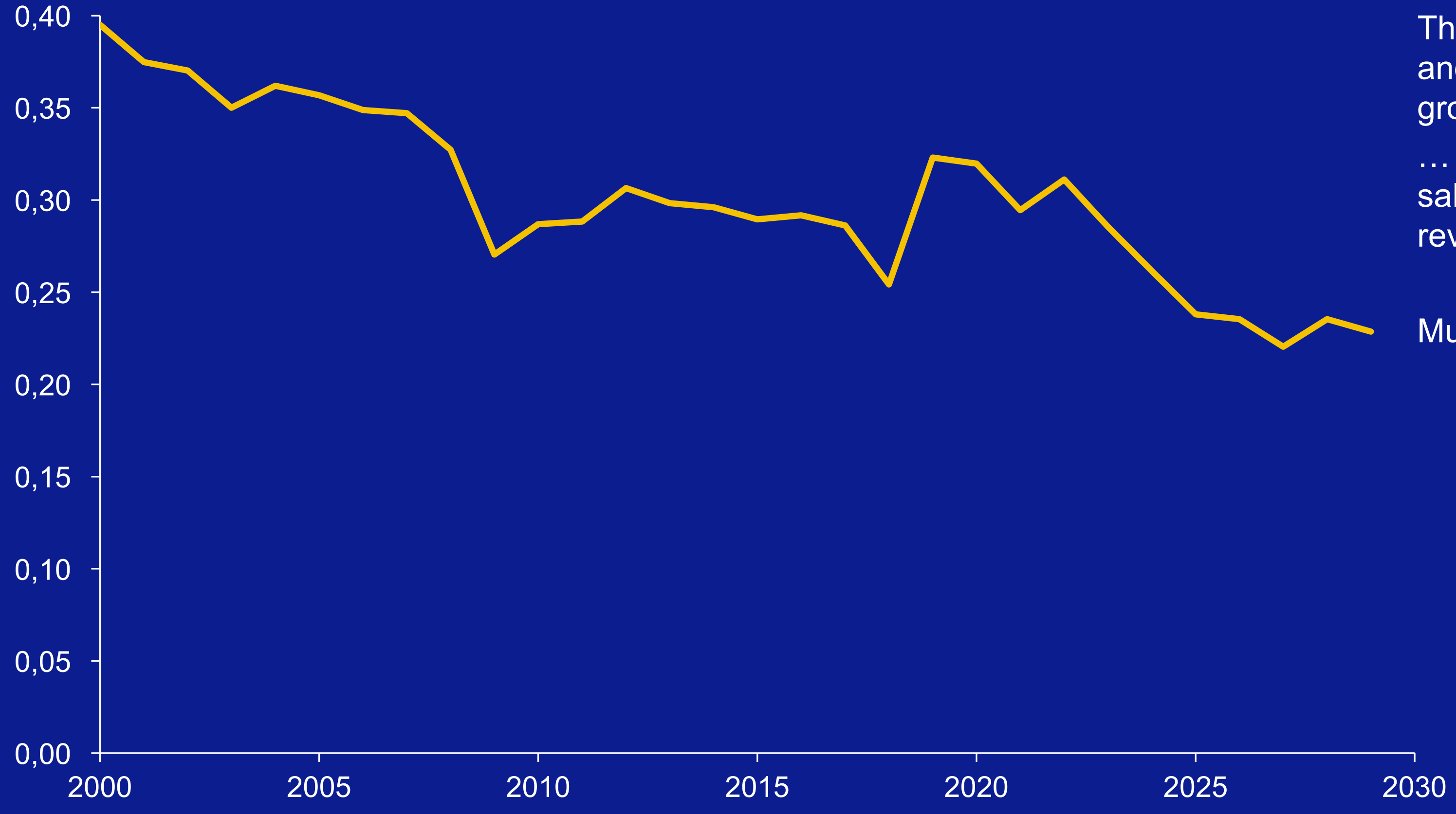
Sales relatively flat due to increased use of SLT and wafer level burn-in, and small changes in overall burn-in test times

Downturns are Rare:

Dotcom crash (2001), Financial crisis (2008/9)

Multiple factors (2023)

Test and Burn-in Socket Sales as a % of Semiconductor Revenues



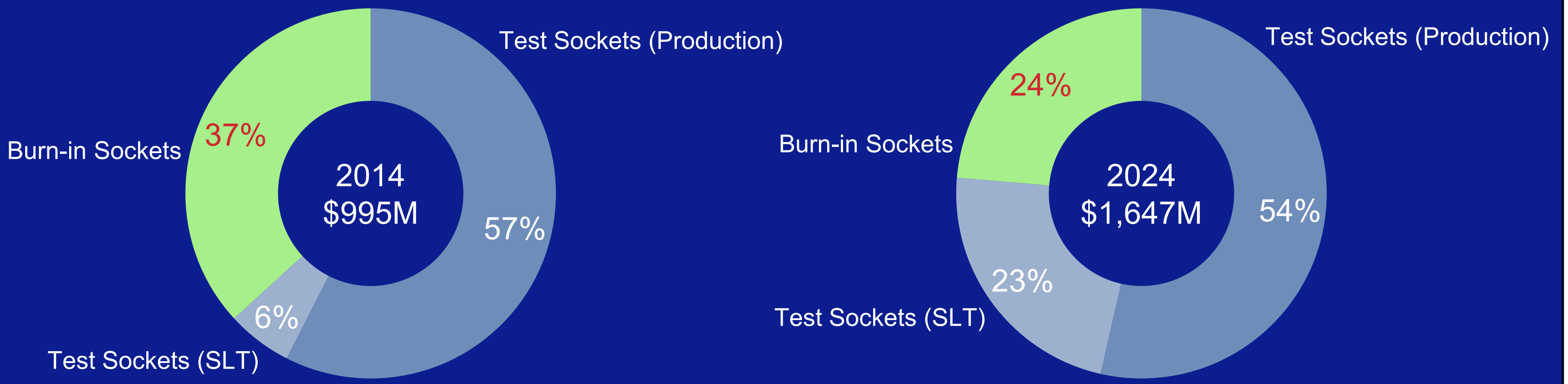
The absolute value of the test and burn-in socket market is growing…

… but test and burn-in socket sales as a % of semiconductor revenues is declining

Multiple factors are in play:

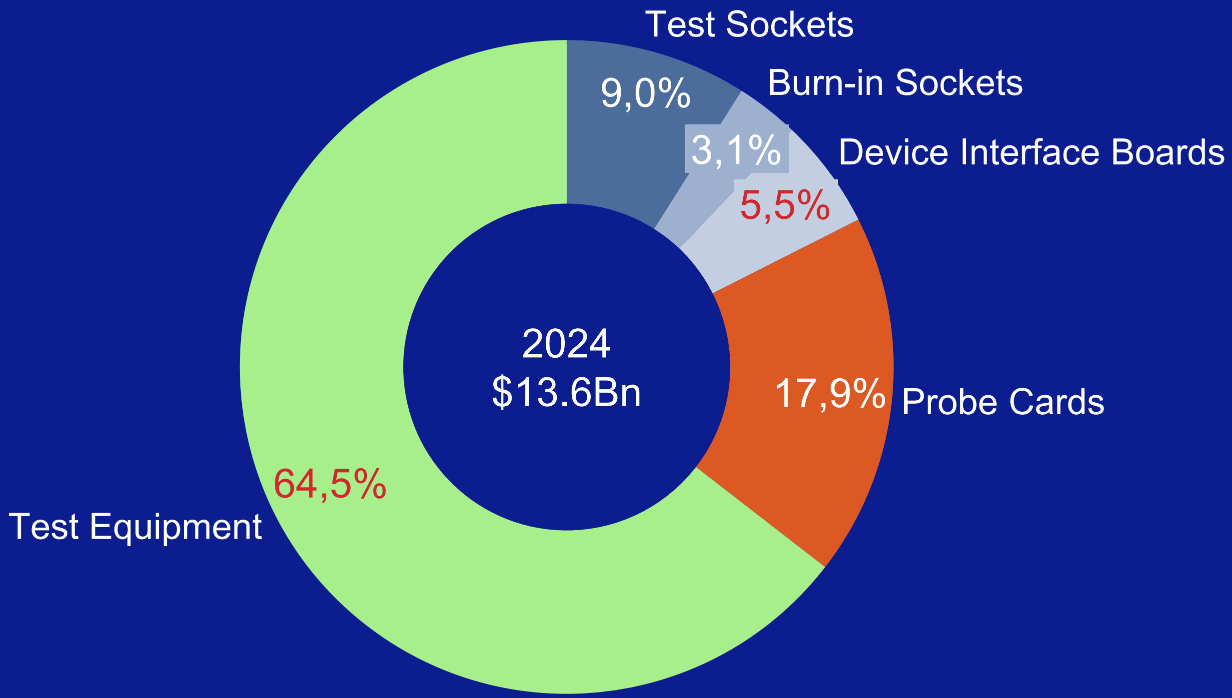
- Average selling price of leading-edge semiconductors is increasing
- Overall test times are increasing
- More test at wafer sort and die sort
- More burn-in at wafer level
- Multiple die in a single package
- For leading-edge devices the cost of sockets as a % of device revenues is very low

Test and Burn-in Sockets by Socket Type, USDM



- Socket revenues for System Level Test (SLT) grew rapidly from 2014 to 2024
- Initial ramp of sockets for SLT now complete, and expected to grow in-line with the overall socket market
- Outlook for 2029 – similar to 2024 profile

Overall cost of test equipment and consumables



Key dynamics:

– Test & Burn-in Sockets 12.1% of total test equipment and consumables costs in 2024. and falling to 11.1% by 2029

– 5.3% compound annual growth rate (CAGR) for sockets from 2024 to 2029

– Overall test and consumables market growing at a CAGR of 7.2% and reaching a value of $19.3Bn in 2029

– Test costs do not scale in the same way as investments in wafer fab equipment or advanced packaging

– Data analytics – not included but a growing cost

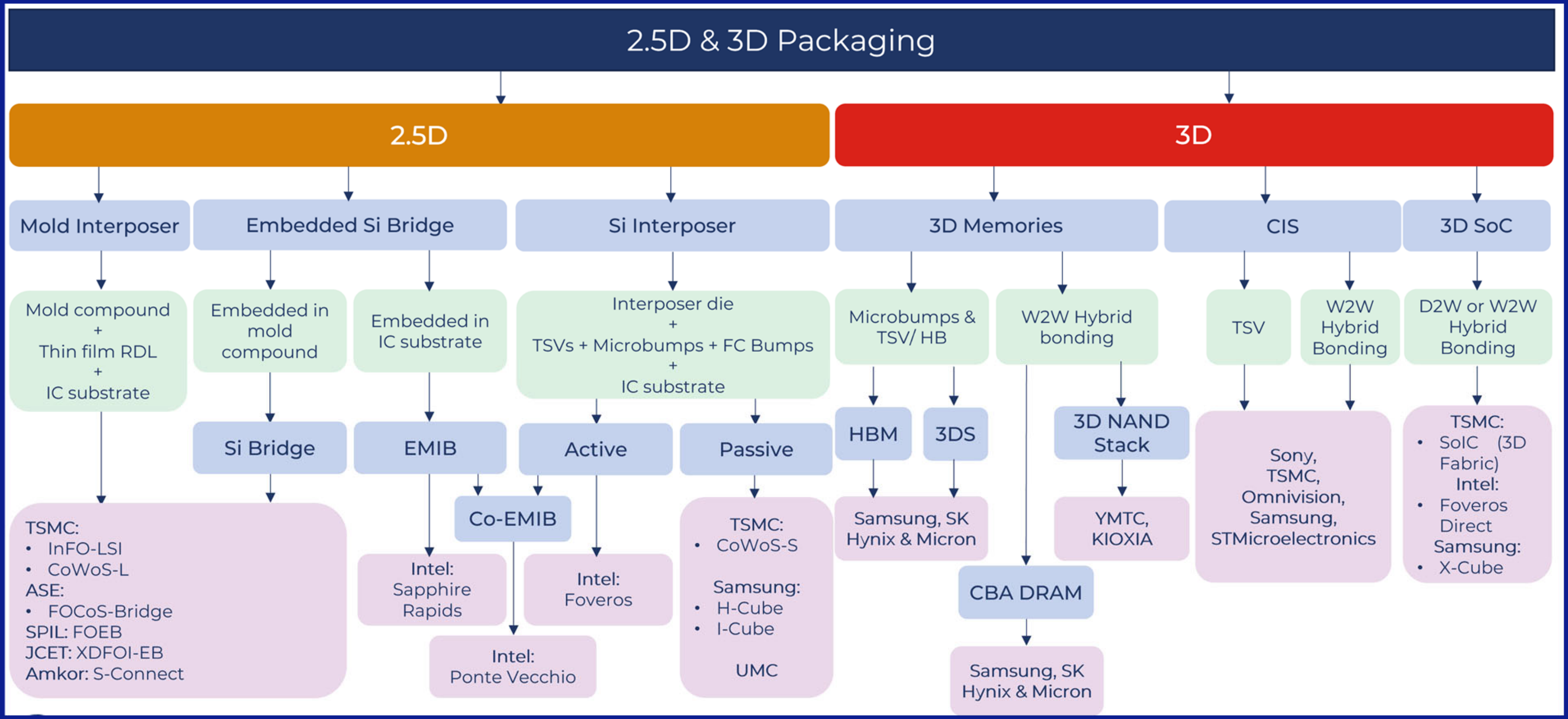
TestConX 한국 Korea

What next for Asian suppliers of test and burn-in sockets?

25th ANNIVERSARY

High-end performance packaging: All platforms

Multiple package types and applications require multiple test solutions

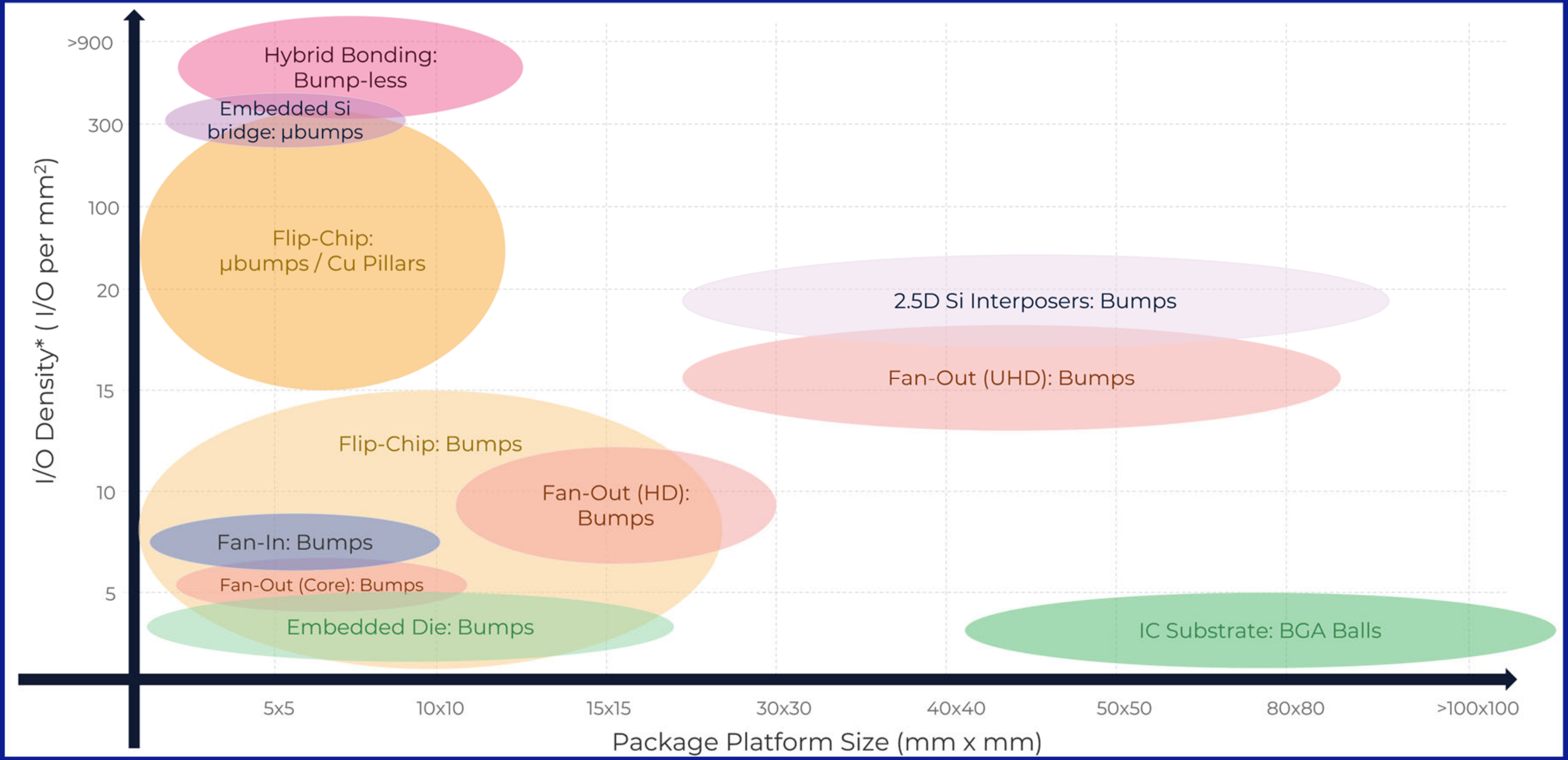


What next for Asian suppliers of test and burn-in sockets?

11

Advanced Packaging – Technology Road Map

by I/O Density and Package Platform Size

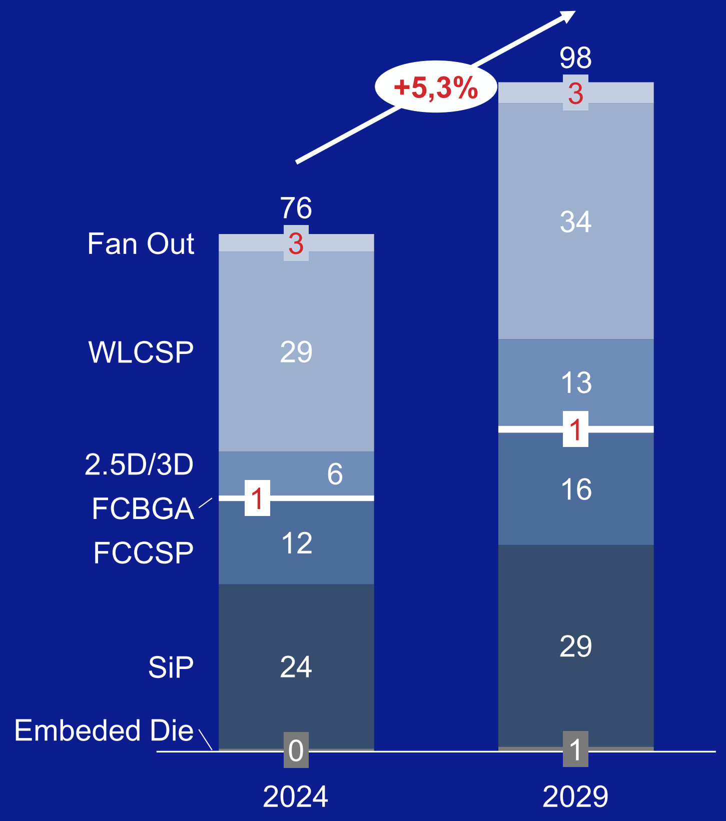


Trend for larger packages with higher pin counts and higher pin density

Glass cores present new assembly and test challenges

Increased test complexity, test times, and thermal management issues driving a change in test solutions

Advanced Packages – Billions of Shipments



Advanced packages accounted for only 15% of semiconductor unit shipments in 2024

Sockets for testing advanced packages estimated to be in the range of 40% to 50% of total socket revenues

Majority of socket revenue growth in the next 5 years will be driven by high-performance devices

TestConX 한국 Korea

What next for Asian suppliers of test and burn-in sockets?

Key Takeaways: Market and Technology Trends

Test & burn-in socket market on track to grow at a CAGR of 5.3% over next 5 years

Market will exceed $2Bn by 2026

Sockets for testing devices in advanced packages account for 40% to 50% of revenues

Main growth market – test sockets for testing high-performance devices

New advanced packaging technologies require new test solutions

Final Thoughts

This is a dynamic and vibrant market

Suppliers of test & burn-in sockets need to respond quickly to changes in market environment and technology

Success requires closer collaboration with socket buyers, supply chain partners, and market researchers to stay ahead of the game

Presentation / Copyright Notice

- The presentations in this publication comprise the pre-workshop Proceedings of the TestConX Korea workshop. They reflect the authors' opinions and are reproduced here as they are planned to be presented at TestConX Korea. Updates from this version of the papers may occur in the version that is actually presented at TestConX Korea. The inclusion of the papers in this publication does not constitute an endorsement by TestConX or the sponsors.
-

-