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March 3 - 6, 2019
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Mesa, Arizona
Archive

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Market Update: Semiconductors, Packaging, and Test and Burn-in Sockets

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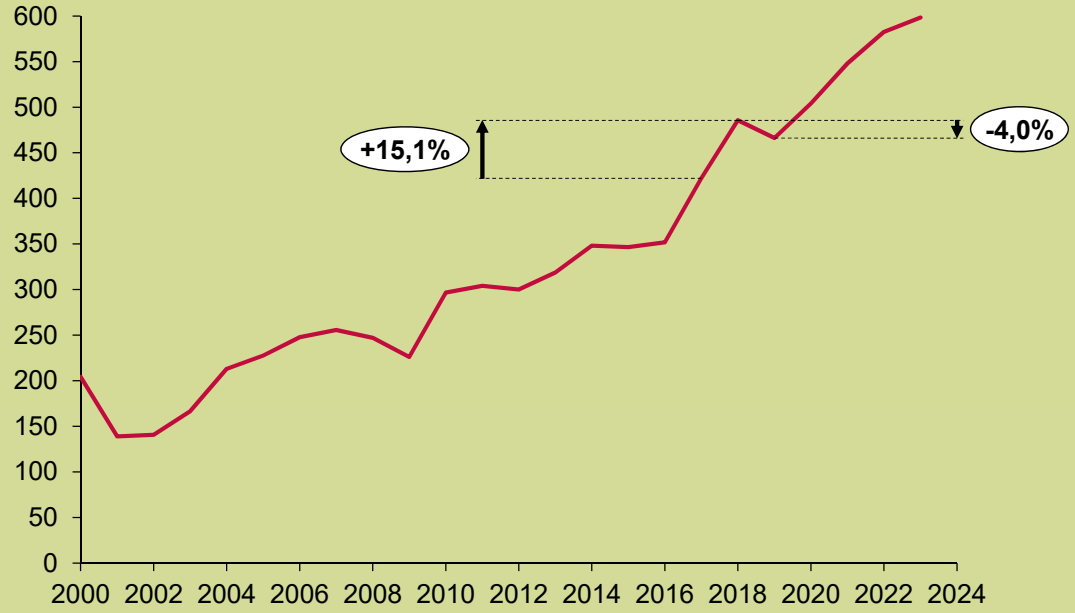
VLSIresearch

This year will be an interesting time for suppliers of test and burn-in sockets…

- What's happening?
- Why?
- … and how does it affect my business?

Semiconductors grew 15.1% in 2018…
…so why didn't it feel like a great year?

Revenues, $Bn



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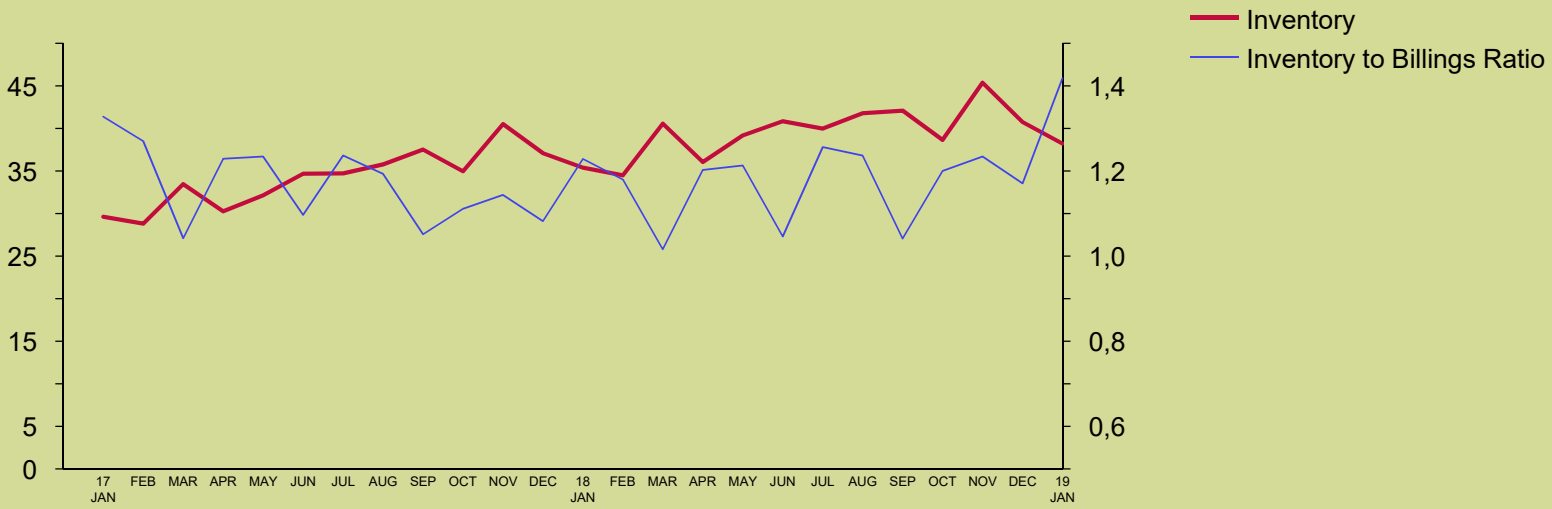
Negative Factors Building Throughout 2018

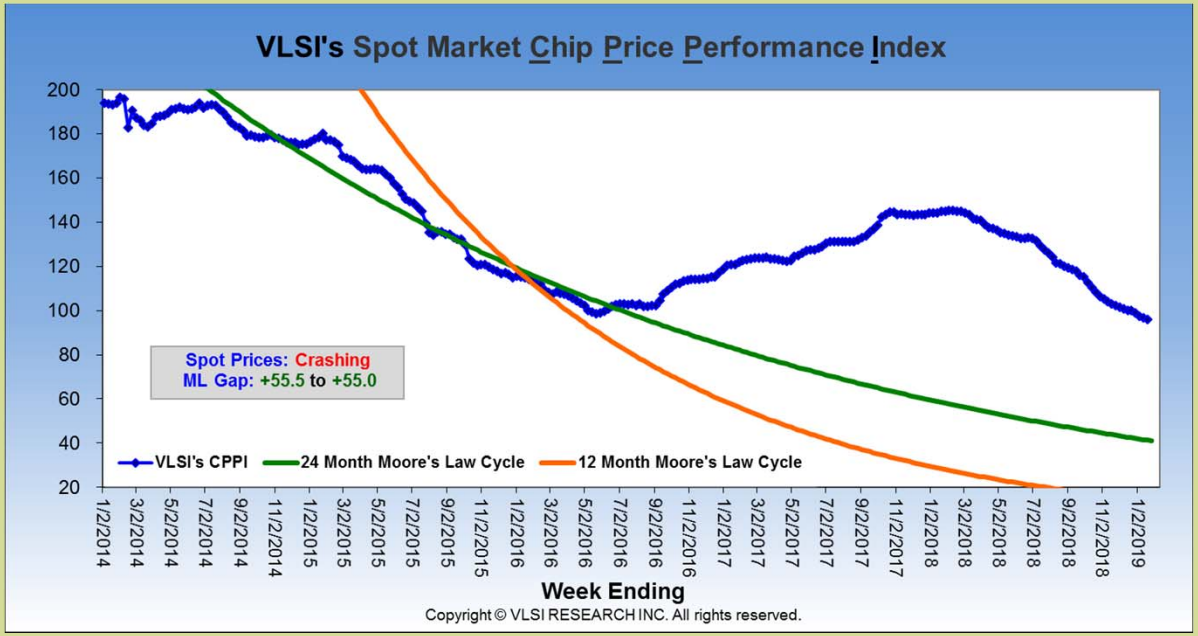
- Smart phone market in decline
- Automotive struggling
- Cryptocurrency bust
- Huawei security concerns
- US vs. China trade war
- World economy slowing
- Capex of major internet companies slowing

Resulting in Growing Chip Inventories…

Inventories in $Bn, Inventory to Billings Ratio in Months of Inventory

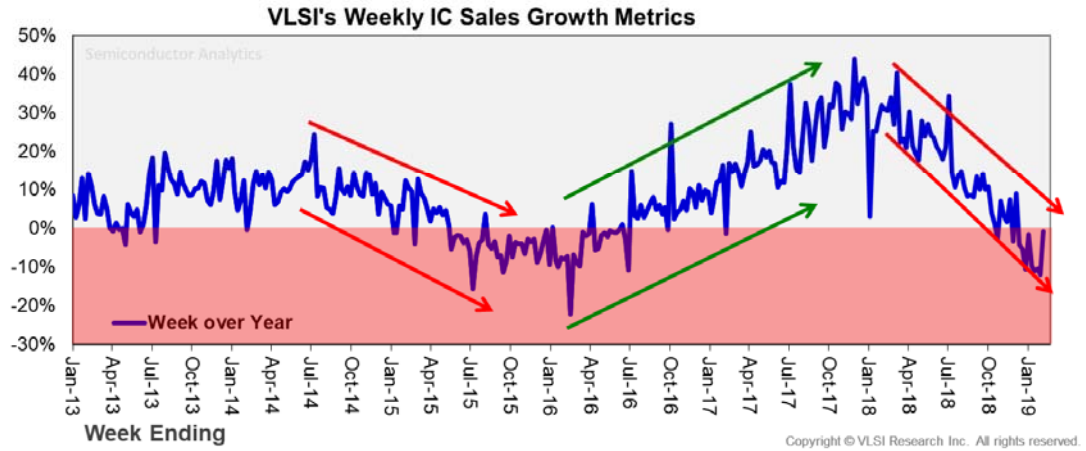


… and falling prices



So, when did this downturn actually start?

Week-over-**Year** IC Sales Growth Trends



- First half of 2018 strong
- Peak growth called in March 2018
- Chipmakers slashed capex in March 2018
- Second half 2018 declining rapidly
- Semiconductors in negative territory in November 2018

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Supply / Demand Heat Map Q1-2019

	DRAM	NAND	IDM	Foundry	Analog/Power
Status	Oversupply easing.	Oversupply continuing due to weak mobile demand	AI, IoT, Cloud, PC strong	Weak mobile and crypto crash pulling demand down	Industrial strong, auto weak
Capacity	Balanced	Loose	Tight	Oversupply	Balanced

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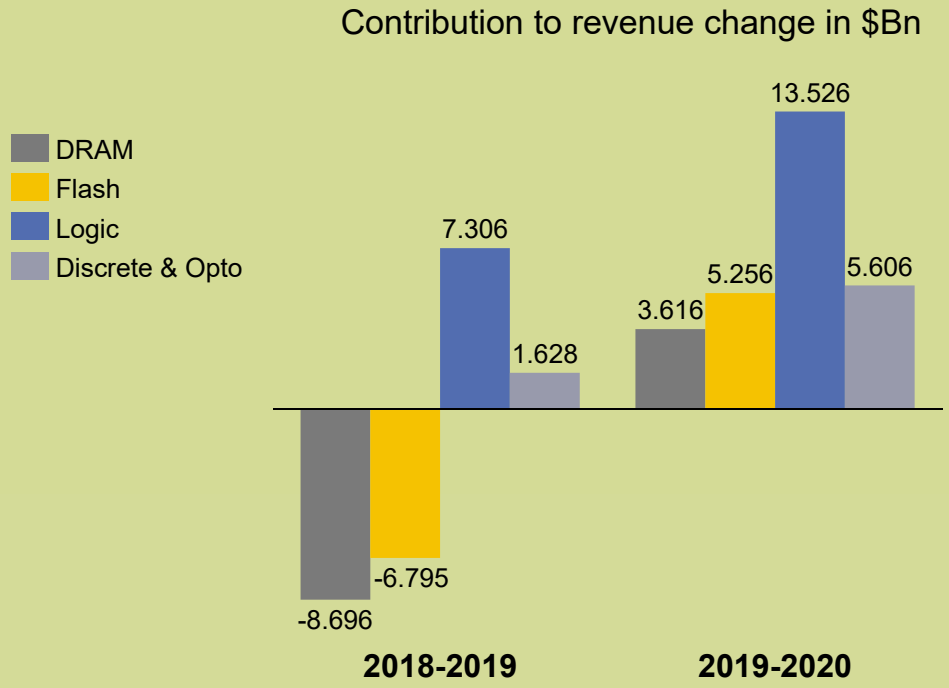
Memory pulling the market into negative territory in 2019…
… Logic leading the recovery in 2020



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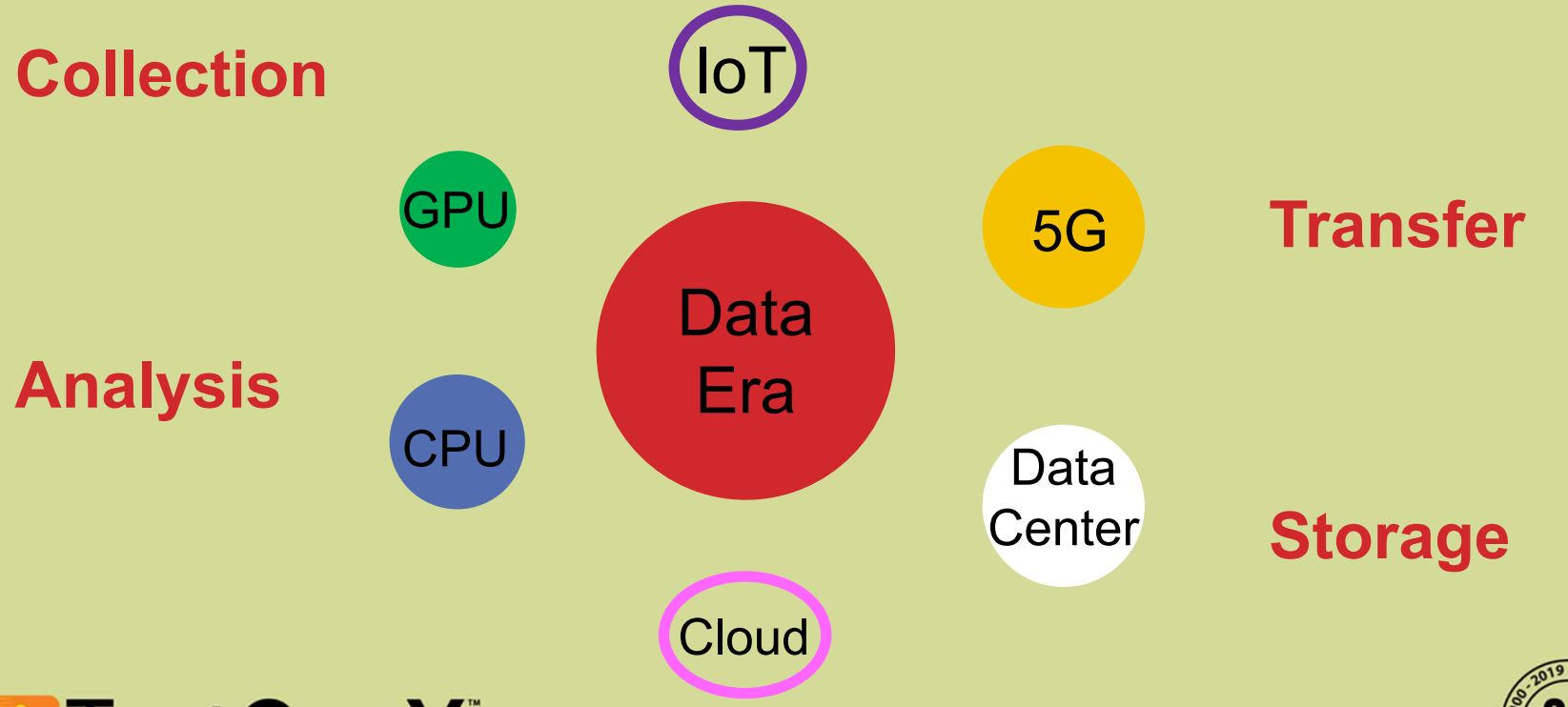
It's not all bad news…. Big Data is Coming



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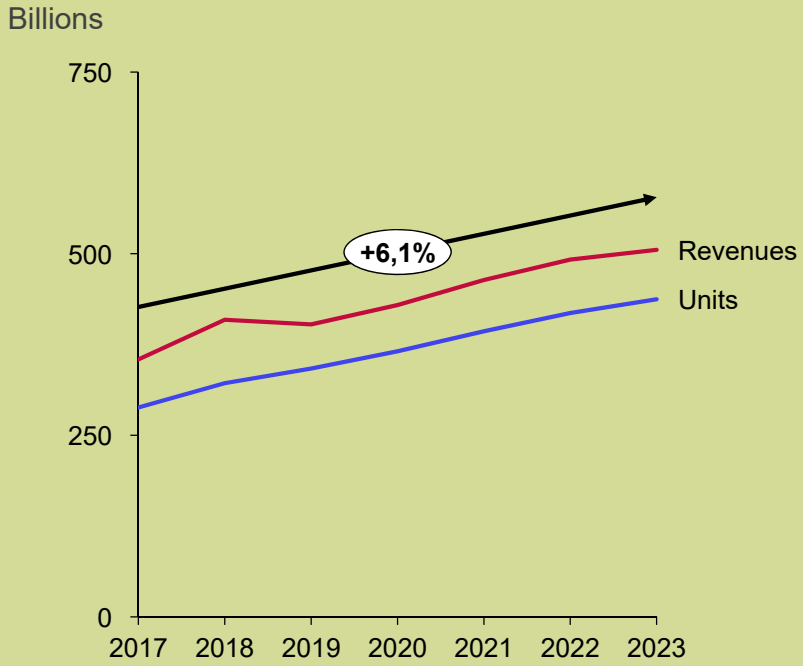
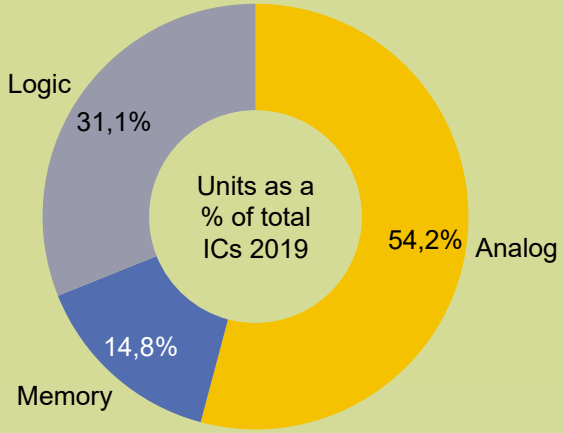
How does this affect the test and burn-in socket market?

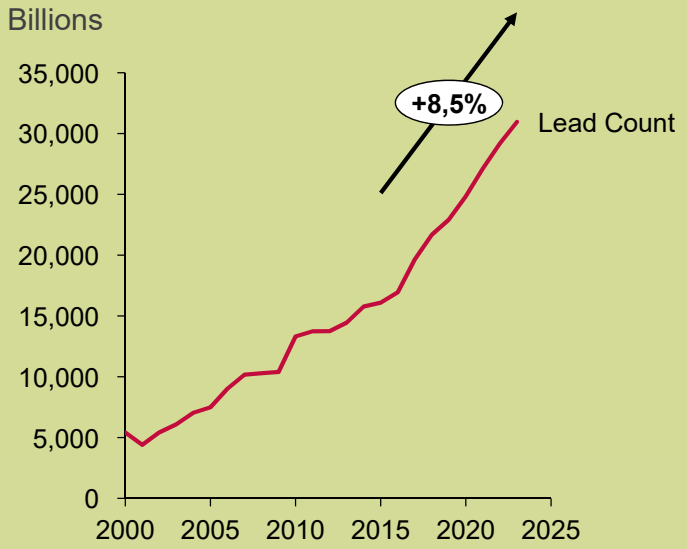
- Big data will drive unit demand across all devices
- Package complexity is on the increase
- Test times likely to grow
- More and more devices will be harder to test
  - Higher costs of test
  - No solutions for some applications

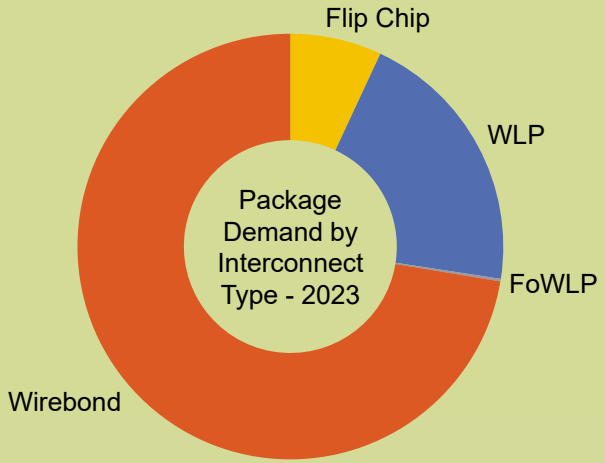
Semiconductors (Excluding discrete components and optoelectronics)
Revenue growth may vary, but units show steady growth





Strong growth in number of leads
Advanced packaging less than 30% of total by 2023





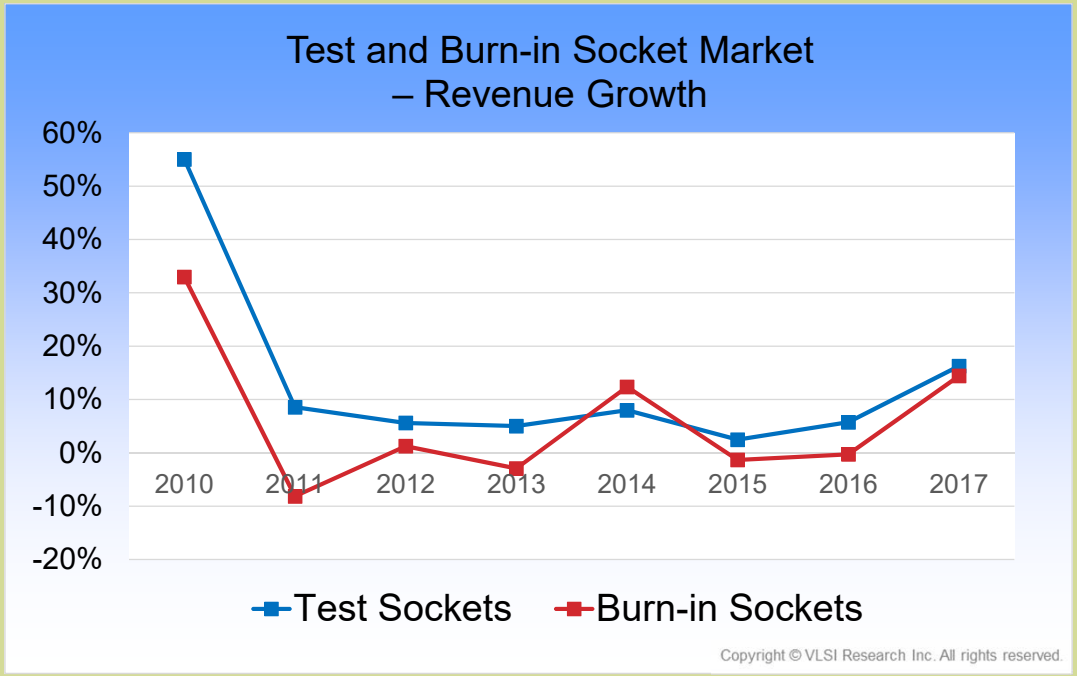
Challenges for Test and Burn-in Socket Suppliers for Leading-edge Applications

- Design Complexity
  - Electrical
  - Mechanical
  - Thermal
- Manufacturing Complexity
  - Material requirements by temperature
  - Yield and lifetime requirements
  - Special package types

More Commoditized Burn-in Sockets vs. Relatively Differentiated Test Sockets

- Burn-in sockets: mainly driven by capacity requirements
  - Large unit demand makes price an important consideration
- Test sockets: driven by both technology & capacity requirements
  - Large product variety
  - Small volumes
  - Fast delivery
  - Better pricing

What usually happens during semiconductor downturns. Test sockets vs. burn-in sockets

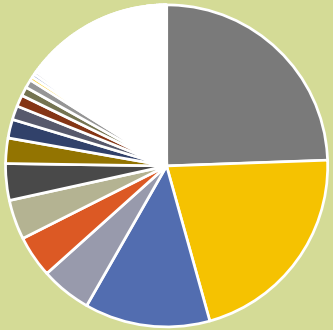


Historically, burn-in sockets are more sensitive to changes in semiconductor demand

Demand for test sockets usually stays positive even during mild downturns

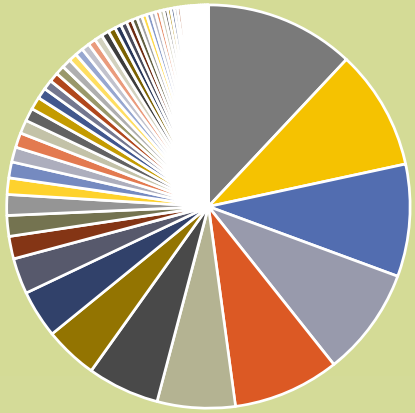
Burn-in vs. Test Socket Suppliers

Market Share of Burn-in Socket Suppliers (Market Size - >$450M)



Burn-in socket market is dominated by top suppliers. Top 3 suppliers account for more than 55% market share.

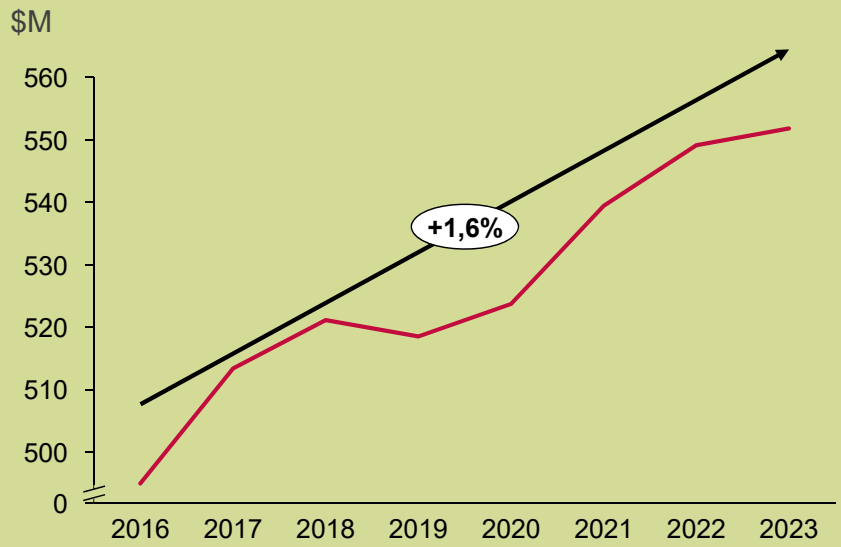
Market Share of Test Socket Suppliers (Market Size - >$750M)



Market share distribution among top 5 test socket suppliers is very balanced.

Load Boards

- Long-term growth rate of 1.6%
- Prices for leading edge boards growing much faster
- Multiple technical challenges
- Many design options
- Few board manufacturers with advanced capabilities

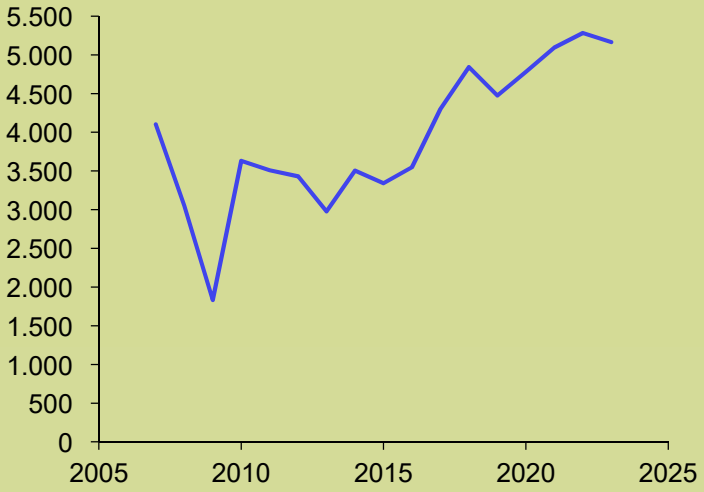


Testers, Test Handlers and Burn-in Systems

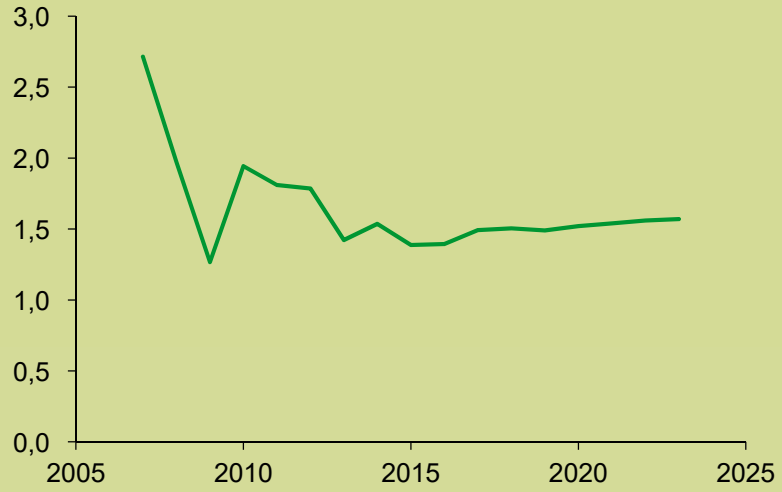
- Automated Test Equipment
  - Over $3Bn market
  - Top 2 Vendors account for 75% market share
  - Japan and US lead
- Test Handlers
  - Over $1Bn market
  - Top 5 vendors account for 75% of total revenues
  - US companies have 40% market share
  - Low cost Chinese vendors entering the market
- Burn-in Systems
  - Over $300M market
  - Multiple vendors

Cost of Final Test

Expenditure on equipment, load boards and sockets, $Bn



Cost per IC tested in Cents (US)



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So, what does all this mean for companies supplying the final test market?

- Big Data will drive huge demand for all device types
- 5G is coming but with problems for test
- Reducing the cost of final test is a continuous challenge
- 2019 will be tough as chipmakers and OSATS focus on reducing costs
- Second half of 2019 should improve