

BiTS 2017

Market Session

EIGHTEENTH ANNUAL

BiTS™

Burn-in & Test Strategies Workshop

March 5 - 8, 2017

**Hilton Phoenix / Mesa Hotel
Mesa, Arizona**

Archive - Market Session

© 2017 BiTS Workshop - Image: tonda / iStock

Copyright Notice

The presentation(s)/poster(s) in this publication comprise the Proceedings of the 2017 BiTS Workshop. The content reflects the opinion of the authors and their respective companies. They are reproduced here as they were presented at the 2017 BiTS Workshop. This version of the presentation or poster may differ from the version that was distributed in hardcopy & softcopy form at the 2017 BiTS Workshop. The inclusion of the presentations/posters in this publication does not constitute an endorsement by BiTS Workshop or the workshop's sponsors.

There is NO copyright protection claimed on the presentation/poster content by BiTS Workshop. However, each presentation/poster is the work of the authors and their respective companies: as such, it is strongly encouraged that any use reflect proper acknowledgement to the appropriate source. Any questions regarding the use of any materials presented should be directed to the author(s) or their companies.

The BiTS logo and 'Burn-in & Test Strategies Workshop' are trademarks of BiTS Workshop. All rights reserved.

Market
Session

BiTS Workshop 2017 Schedule

Tutorial Day

Sunday March 5 - 8:30 pm

Marketplace Report

Ira Feldman

Feldman Engineering Corp.

Market Connections – Semiconductors to Sockets

John West

Managing Director

VLSI Research Europe

Market Connections Semiconductors to Sockets

John West



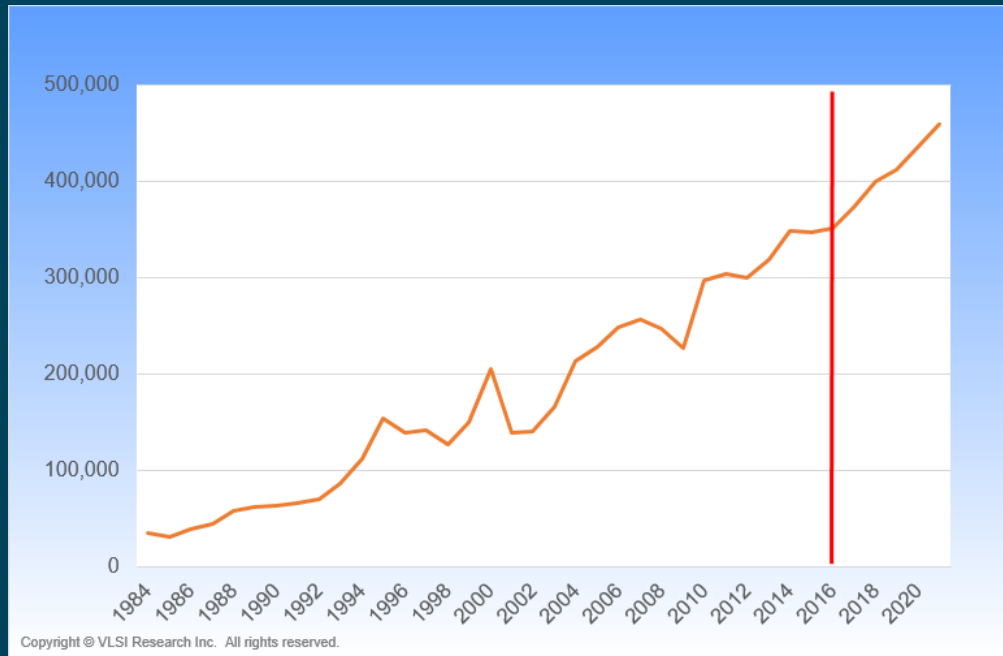
**BiTS Workshop
March 5 - 8, 2017**



Contents

- Semiconductors
 - Long-term Drivers
 - Short-term Indicators
 - Packaging Trends
- Sockets
 - Market Drivers
 - Cost of Test
- Summary

Semiconductors, \$M The Long-term View



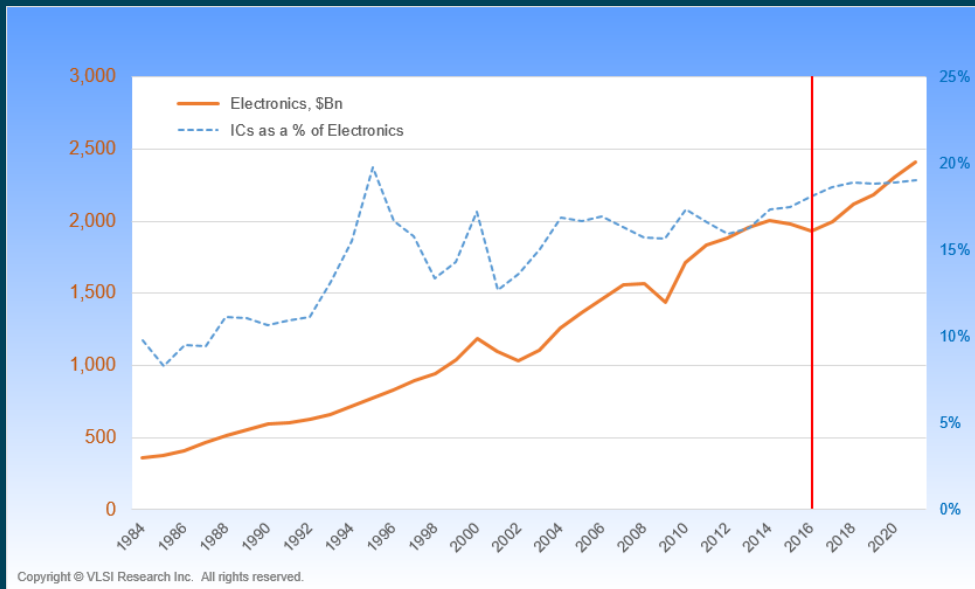
Semiconductors:
flat last 2 years

Electronics:
negative last 2 years

Semiconductor forecast:
+6.9% in 2017
+7.9% in 2018

Should we be worried
about future growth?

Electronics, \$Bn The Long-term View



Electronics:

negative last 2 years

long-term growth of 4.5%

Content Rate:

Semiconductors as a % of
Electronics Revenues

Growing from 17% to 19%

Future Growth?

Electronics

Revenues down, but units up – a marketing problem

It's not just about hardware anymore

content

value added services

Hidden electronics revenues

Future Growth?

Waves of Computing – a different perspective on industry drivers

Mainframe

Mini-computer

Workstation

Personal Computer

Smart Phone and Cloud

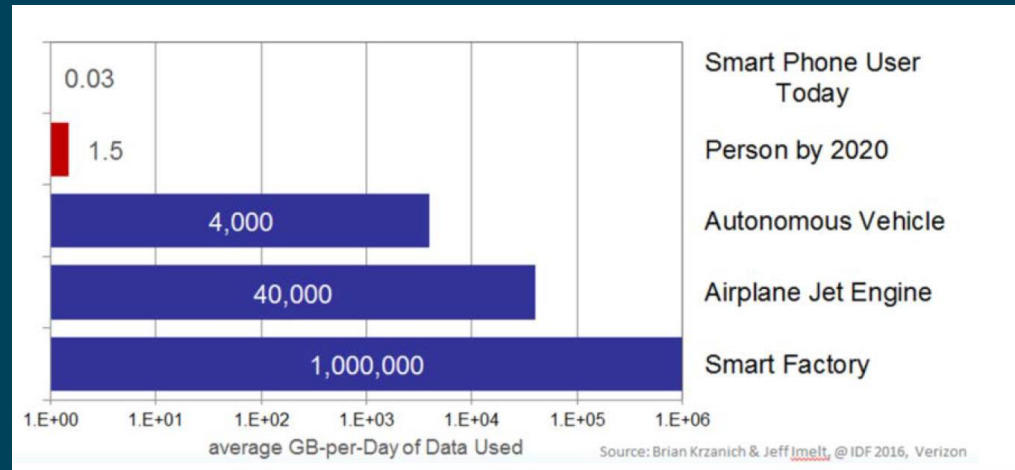
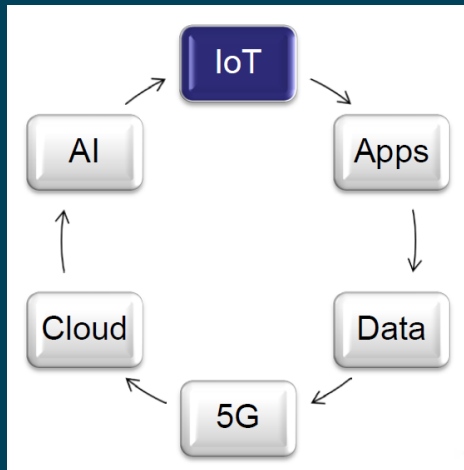
Ubiquitous Computing and Machine Learning

Artificial Intelligence

Each successive wave generates orders of magnitude of demand for chips

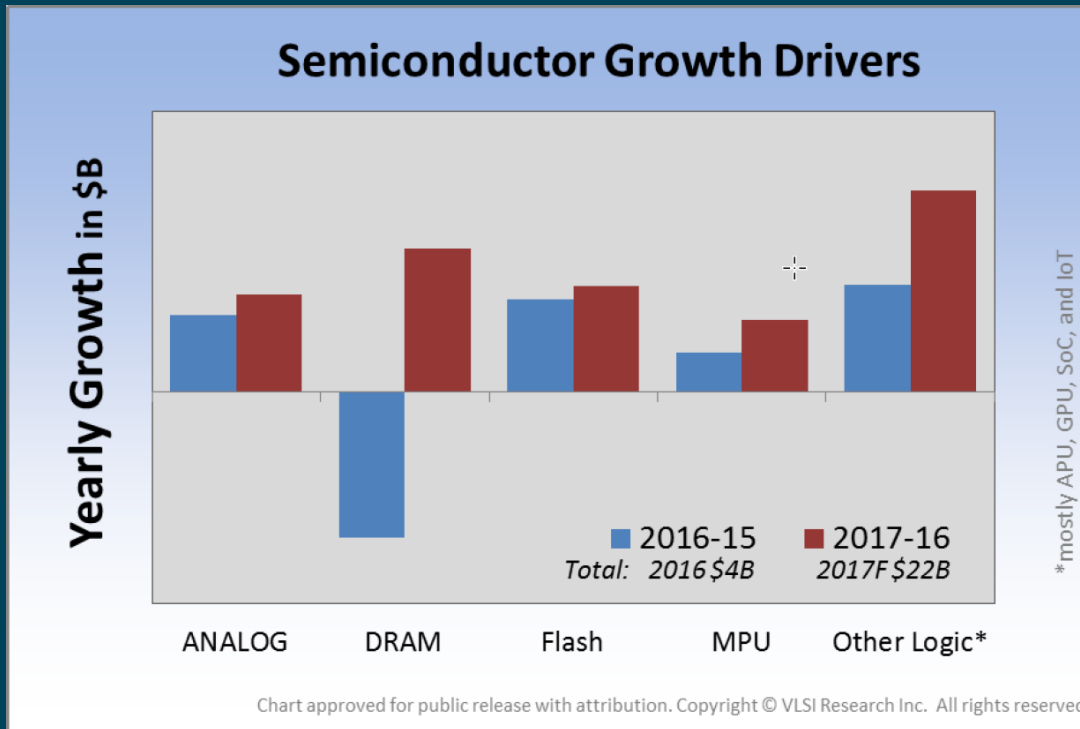
IoT Drives a Data Supply Explosion

It's the engine of the next virtuous cycle



Data needs to be transferred, processed and stored
 IoT is not the opportunity... it's 5G, the cloud and AI

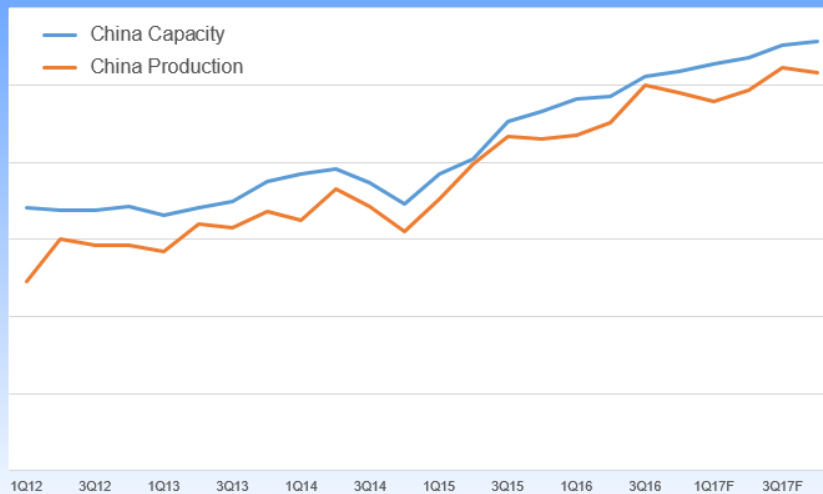
Key Drivers and Pivot Points



- DRAM comes back on strong pricing
- Flash for SSD
- MPU for cloud
- Other Logic Drivers
 - Auto
 - CloT (connected IoT)
 - Smart Grid
 - Smart City
 - Smart Manufacturing
 - Smart Supply Chain
 - Smartphone Replacement

Manufacturing Shift to China

Production and Capacity in Millions of Square Inches of Silicon



Copyright © VLSI Research Inc. All rights reserved.

China accounts for over 10% of worldwide capacity in millions of square inches of silicon.

Steep learning curve to overcome

8 x 300mm Fabs in production

12 x 300mm Fabs under construction

2 x 300mm Announced

Semiconductor Industry betting on future growth

There's a lot of money being invested in new technology and new capacity

10nm and 7nm

3D NAND

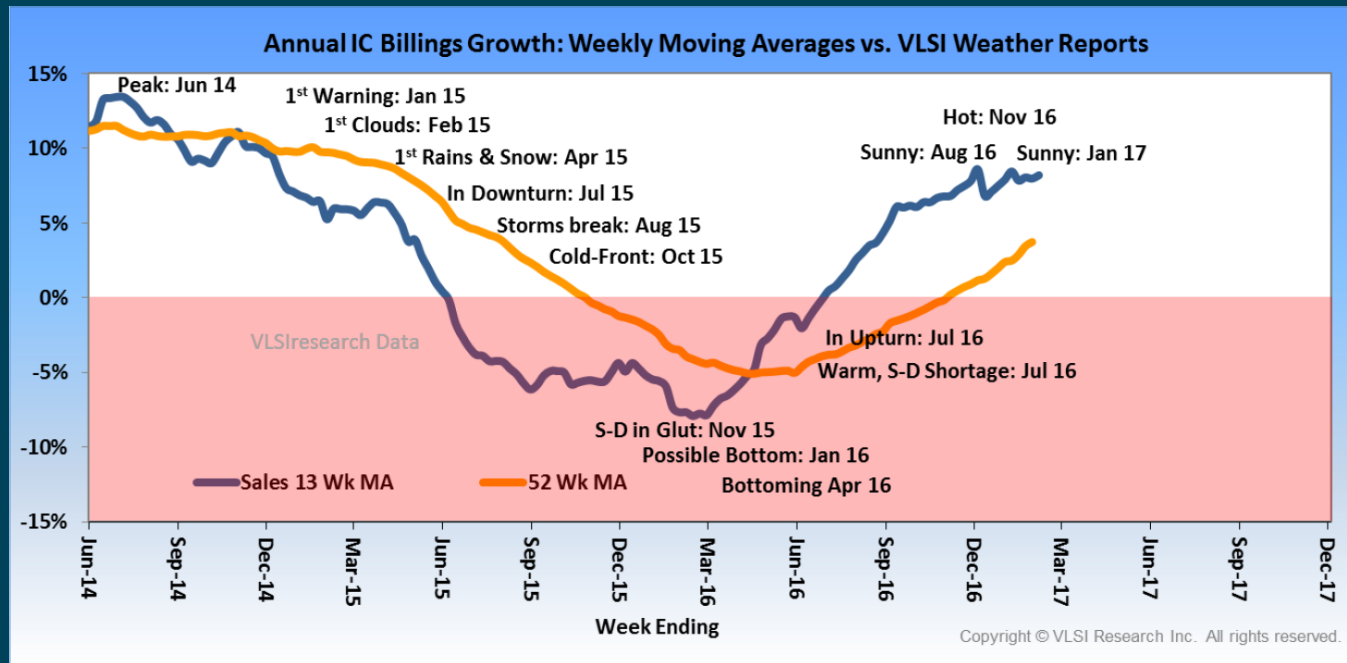
Advanced Packaging

Shift in manufacturing to China

Heavy capex on flat revenues!

Semiconductors – short-term view

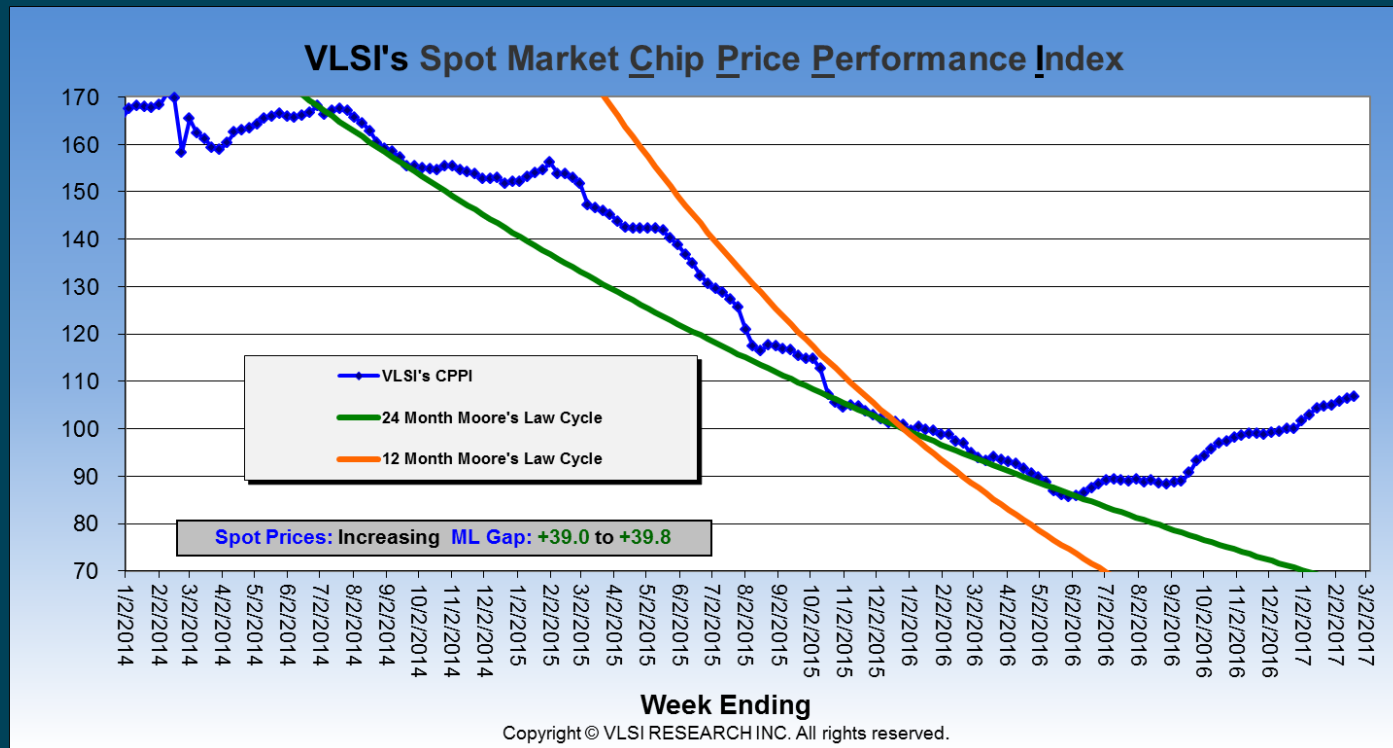
Annual IC Billings Growth: Moving Averages & Weather Reports



In positive territory...but need strong positive IC billings growth to achieve 2017 and 2018 forecasts

*S-D = Supply and Demand

Strong Chip Pricing Trend



2017 and 2018 Shaping up to be good years for semiconductors

Reasons for optimism

- Healthy end markets
- Strong pricing environment
- Plenty of emerging applications

Watch out for

- China – overcapacity and tariffs
- Geo-political change

Semiconductor Units Growing

But only slightly higher than revenues

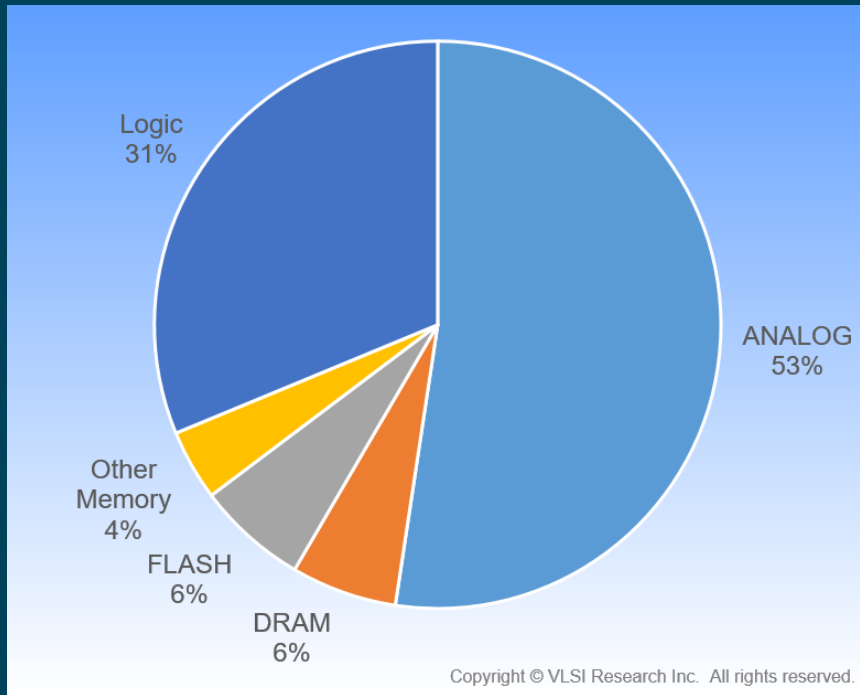
2017 +6.9%

2018 +7.8%

Due to strong pricing

Long-term growth trend +6.7%

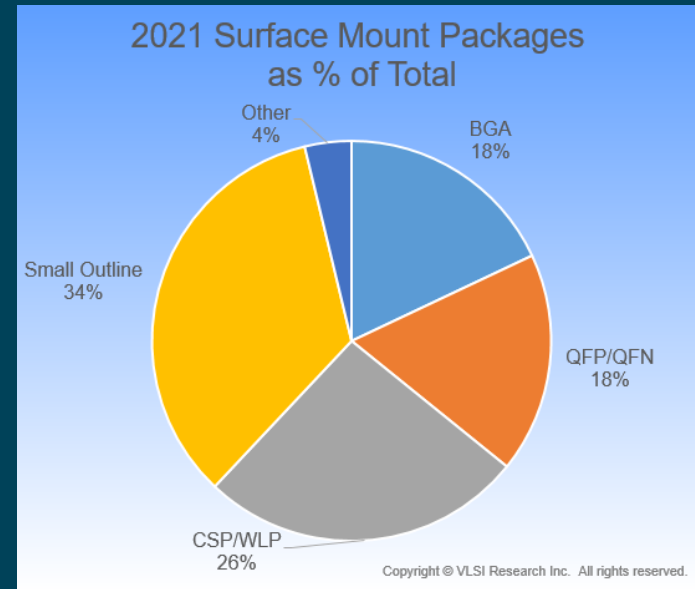
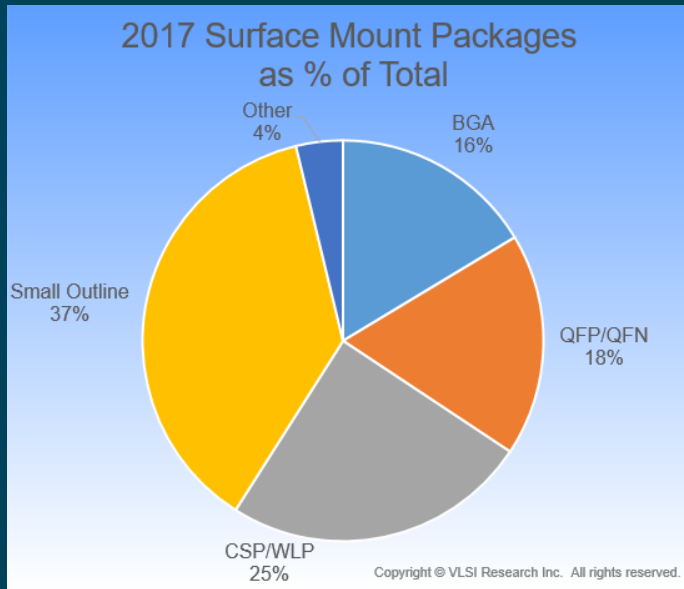
IC Units – Share of Total 2017



270 Bn ICs

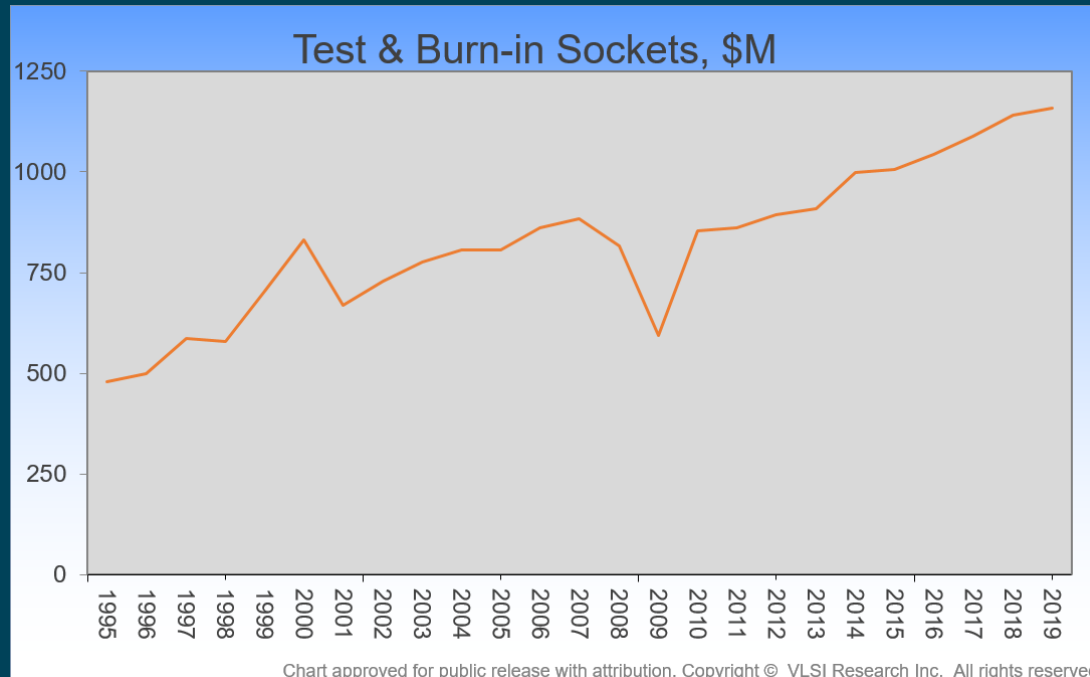
Memory accounts for 16% of total IC unit shipments

Packages



BGA and CSP/WLP packages will be among the best performing segments

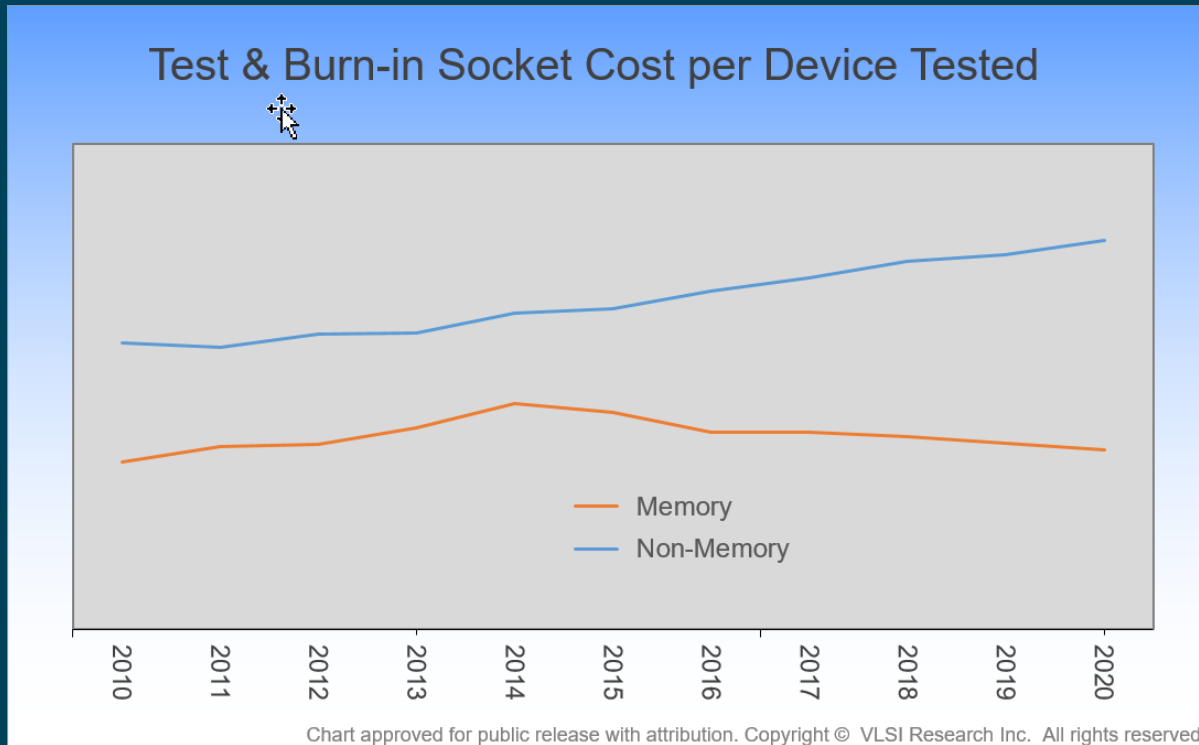
Test & Burn-in Sockets



Long-term growth 3.5% CAGR next 5 years

Lower than semi revenue growth of 5.5% over same period

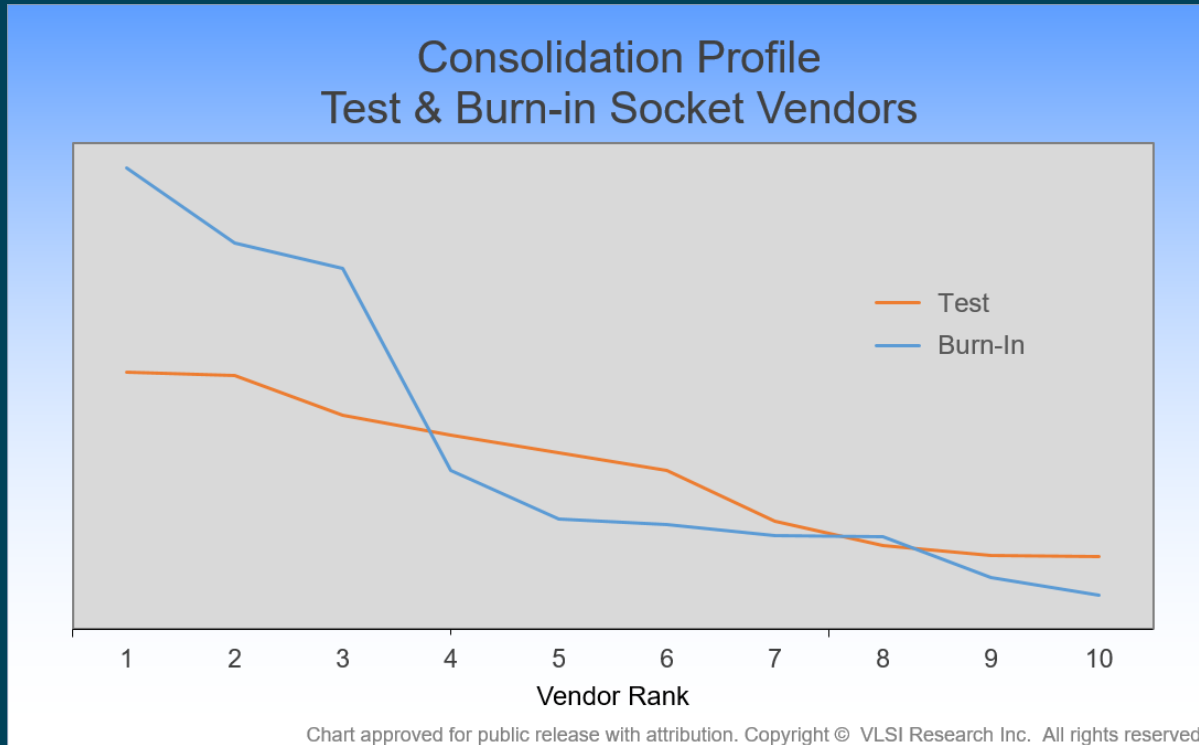
Cost of Test



Memory getting cheaper to test

Non-memory a growing problem

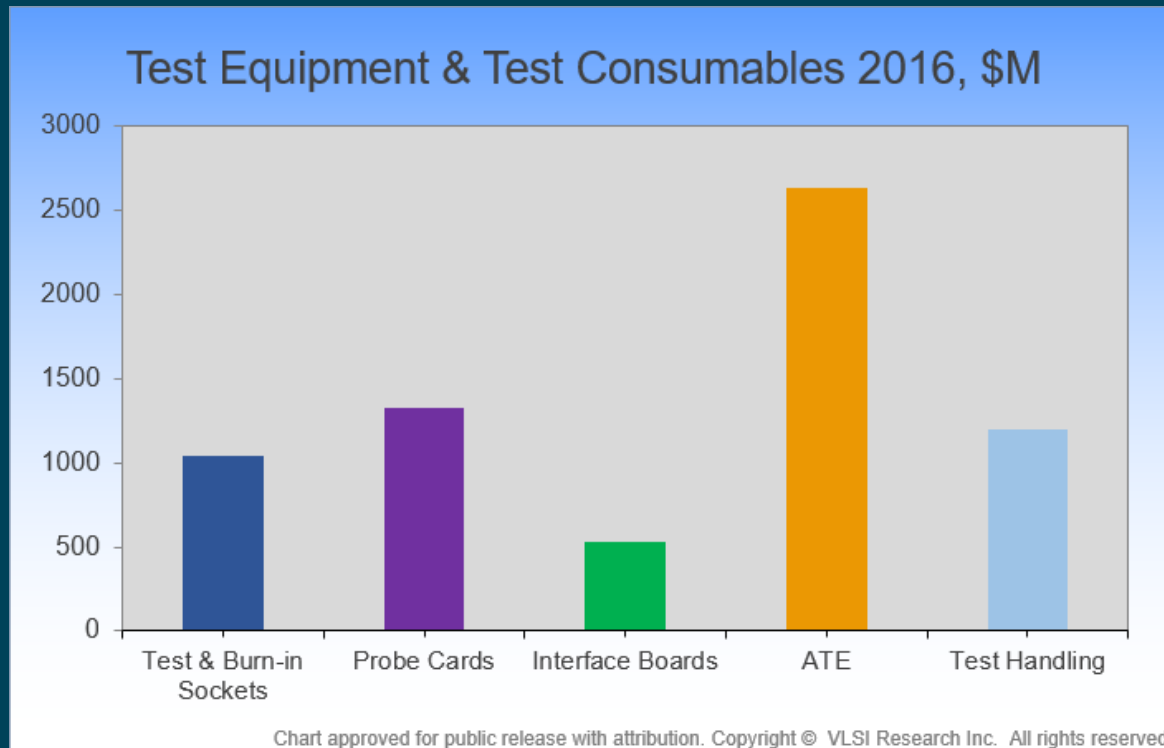
Consolidation?



Burn-in : High degree of consolidation but many small players

Test : Fragmented

Cost of Test



Test Consumables > 43% of Total Test Equipment and Consumable Costs.
Increasing to around 48% by 2021

Outlook for 2017

- Semiconductors
 - Revenues 5.5%
 - Units 6.7%
- Test and Burn-In Sockets
 - Test Sockets 4.0%
 - Burn-In Sockets 2.8%