Test Consumables – The Road Ahead

The Changing Cost Structure of Semiconductor Test

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First, we need to talk about the market environment

Impact of COVID-19. What we know for sure…

Fundamental market drivers for semiconductor still in place
Chips still need testing
Technical problems for semiconductor test not going away
Economic challenges just got a little harder
Semiconductors: Short-Term View
Increased Volatility

Weekly semiconductor sales compared to the same week last year.

First half of 2020 much better than first half of 2019
Semiconductors: Long-Term View, $Bn

Outlook for 2020 is improving

VLSI upgraded forecast for 2020 from -4% to +2%

Growth for Advanced Logic, Foundry and DRAM flat to slightly positive in 2020

Double digit growth for NAND in 2020
Semiconductor Test

Wafer Sort
Package Test
Burn-in Test
System Level Test

Multiple points where die can be tested: on wafer, in package, in module, in system
The Cost of Test – 2019

Test hardware and consumables

- Wafer Sort: 42%
- Package Test: 40%
- Burn-In Test: 7%
- System Level Test: 12%

Total Cost: $10.4Bn
Cost of Test: a big market and it’s growing

Test hardware and consumables, $Bn
Cost of Test
Test hardware and consumable costs as a % of IC revenues

VLSI’s forecast very conservative. Assumes cost of test will return to 2.5% of IC revenues

A growing problem since 2013
Cost of Test
Test hardware and consumable costs as a % of IC revenues

Recent trends in wafer sort and package test not sustainable.
SLT adding to the problem.
Rapid growth of SLT
Likely to pull existing cost structure out of shape

Compound Annual Growth
Rate 2020 to 2025

- 14.4% - System Level Test
- 4.3% - Wafer Sort
- 3.7% - Burn-In Test
- 3.0% - Package Test

2020
2025
Measuring System Level Test Costs

The market for SLT equipment and consumables not easy to measure: until recently quite small, and suppliers not well known

SLT now entering the mainstream and attracting companies with experience in the semiconductor industry

Market likely to be in excess of $1Bn in 2020
Understanding the Dynamics of System Level Test Costs

• Is the recent ramp up just the start of something big, or will it take time for the first round of capacity expansion to be digested?
• Will chipmakers test some or all products?
• Can test handlers be recycled/re-used for new products?
• What are the efficiency gains to be made over time, if any?
• Will some chipmakers continue to make their own test systems?
System Level Test Costs

Currently around $1.0Bn

Growing at a compound annual growth rate of 14.4% over next 5 years

This will result in a change of the cost structure of test
Cost has become a critical problem so what can be done?

Change in test strategy

Squeeze suppliers

Both options involve risk
Squeezing Suppliers: Cost vs. Risk

Buyers are asking a new set of questions

Am I paying too much?

We are not happy with the existing supplier, who else should I be talking to?

We want to encourage and support new entrants. Who are good candidates?

Which suppliers need help, which need to be challenged?

What type of relationships should I be having with my suppliers?

Answering these questions requires more than just numbers
Example of Risk Analysis
Segment market shares by vendor rank 2019

Test Hardware Segments: ATE, Handlers & Probers
Dominant supplier with strong second source
Is this OK?
Example of Risk Analysis
Segment market shares by vendor rank 2019

Test Consumable Segments: Probe Cards, Sockets, Loadboards
Fragmented, multiple suppliers
Squeezing suppliers is low risk, right?
The buyers’ challenge
The cost structure of test is changing

You need data, data analytics, and the stories behind the data so that you can...

Identify where costs can be managed, and where they cannot

Evaluate risks and understand how they change over time
Final thoughts

Challenges exist and are not going away

Closer collaboration between suppliers & buyers would be nice

Find solutions that you can live with
Questions?

... and backup slides
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