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# Opportunities and Challenges of the Chinese Test & Burn-in Socket Market

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**VLSI**research



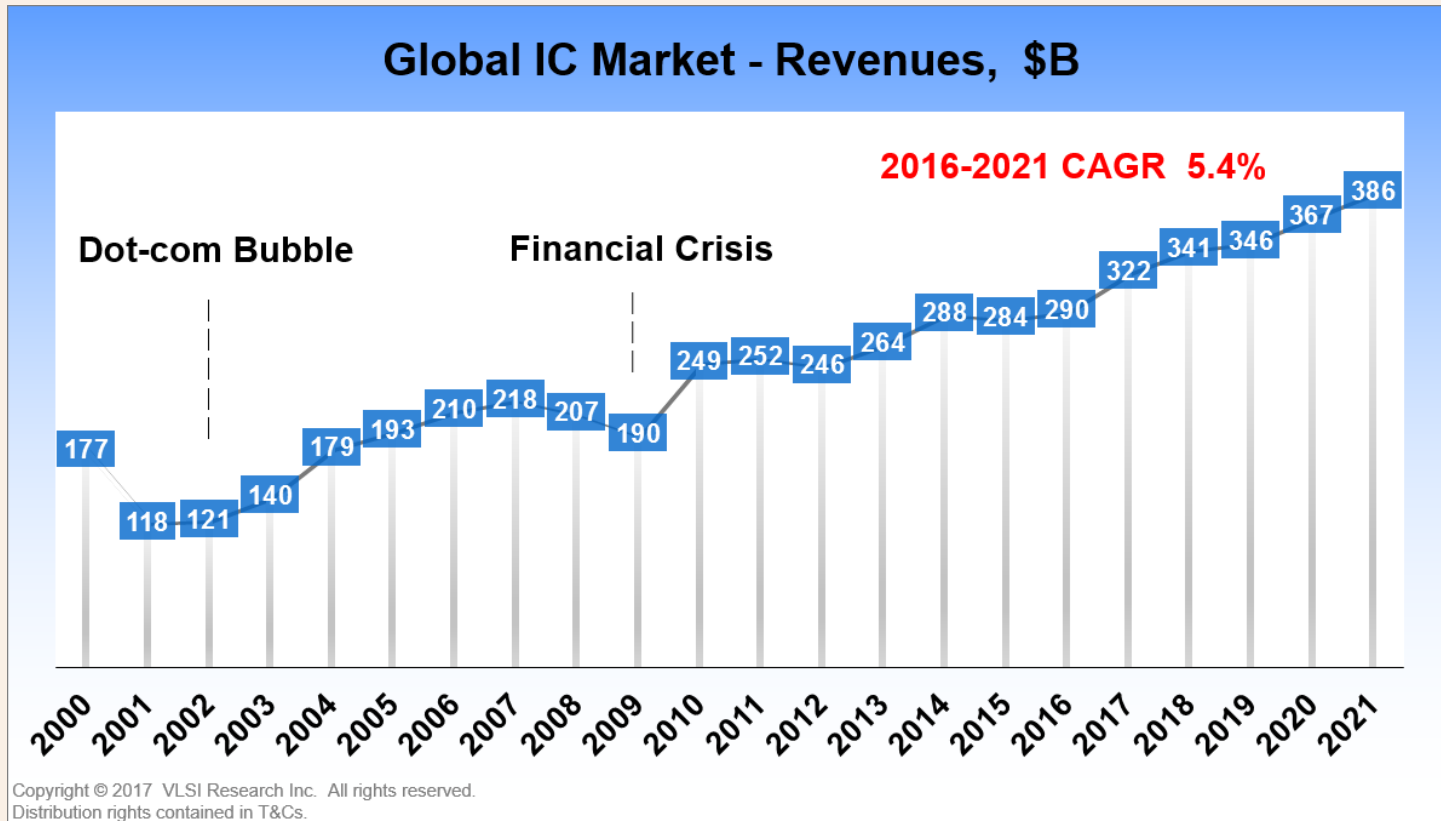
## Contents ---- Global Market

- **Global IC Market**
  1. What's happening in the long-term?
  2. What's happening now?
  3. What does this mean for socket suppliers?
  
- **Global Test and Burn-in Socket Market**
  1. Market size
  2. Region of consumption
  3. Top vendors and market shares

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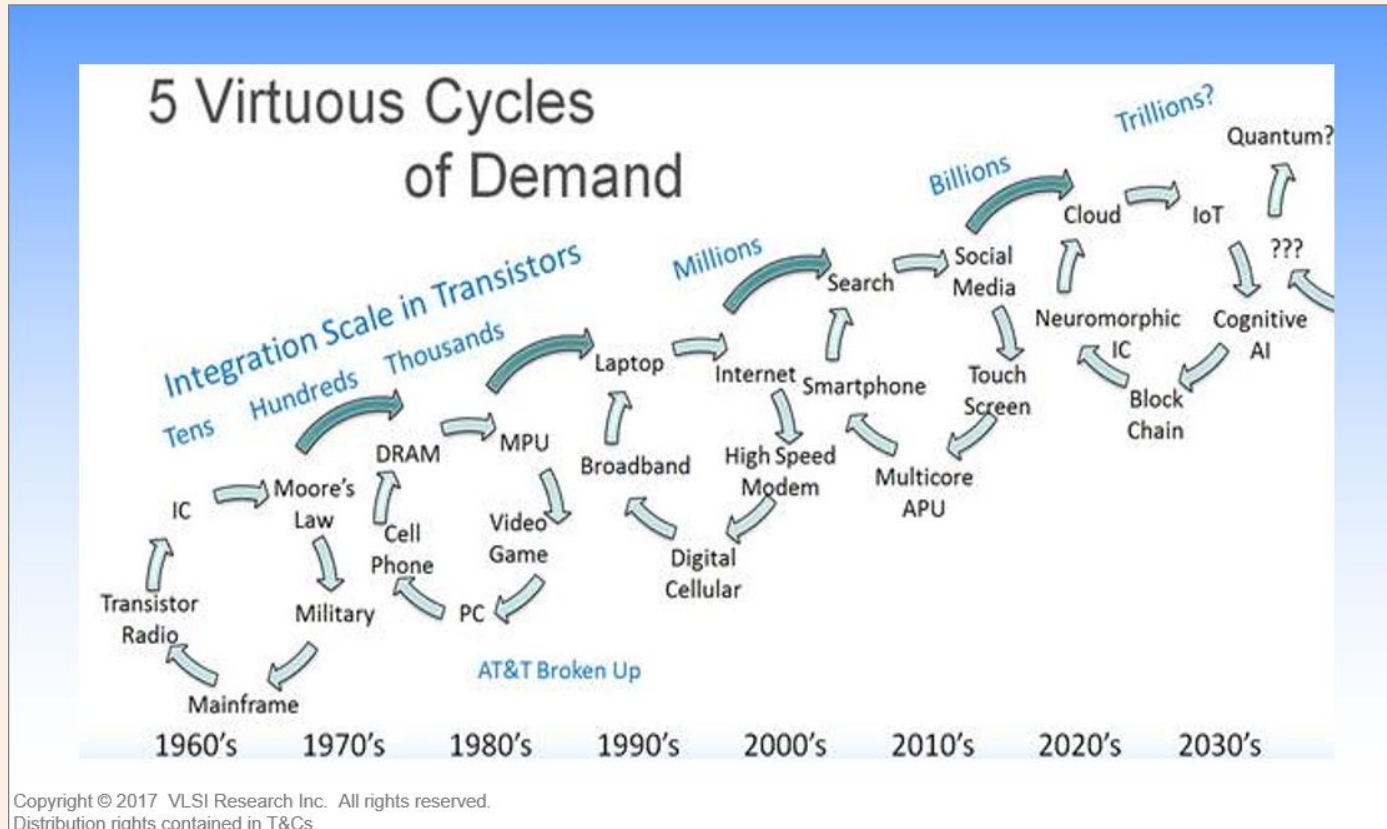
## Global IC Market



**Obviously, the IC market is on a trend of continuous growth**



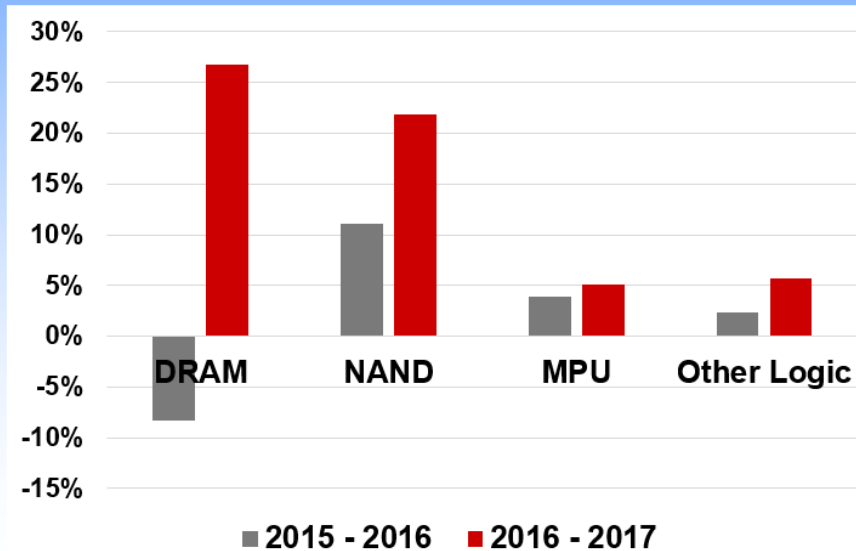
## 5 Virtuous Cycles of Demand



**Exponential Growth: Tens to Billions in 60 years**

## IC Revenues in 2017

### Annual growth rate of Drivers in 2016 & 2017



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**4 fast growing segments**

**Memory**

- DRAM (27%)
- NAND Flash (22%)

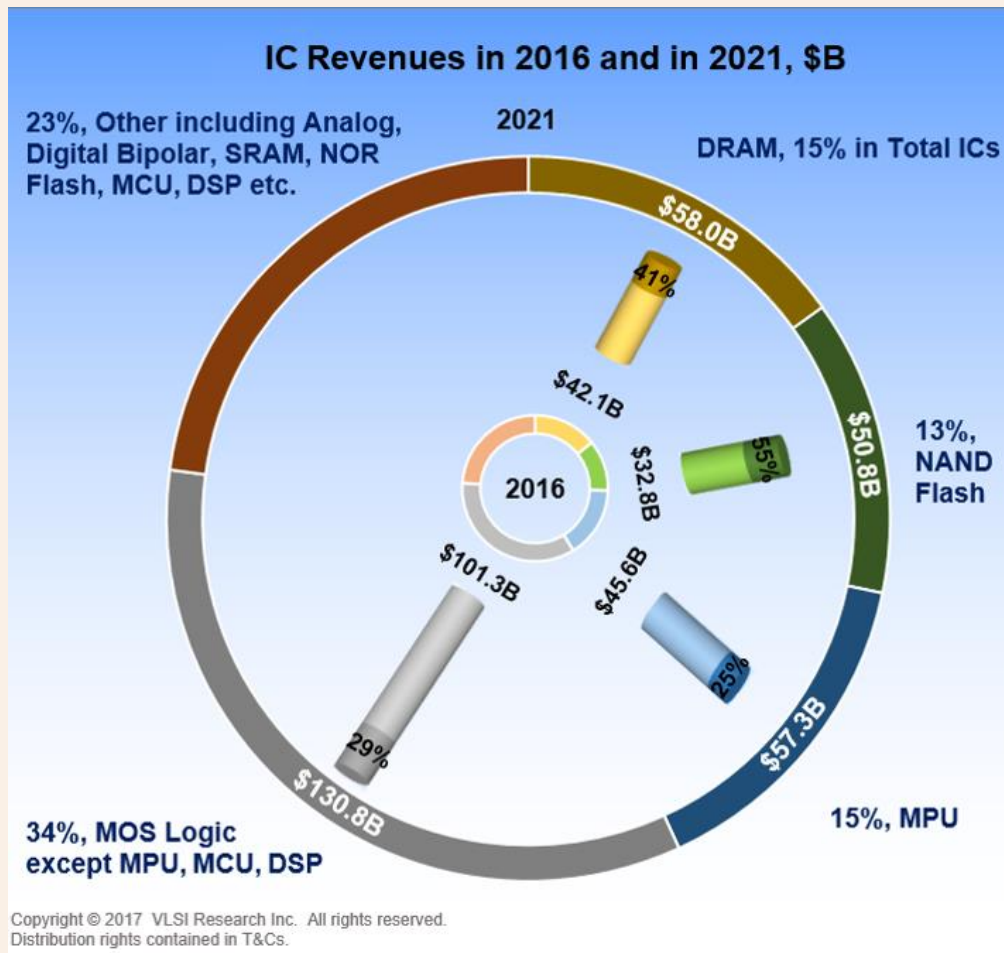
**MOS Logic**

- MPU (5%)
- Other Logic (6%)

**Overall growth > 10%**



## IC Revenues in 2021



### 4 fast growing segments

#### Memory

---- DRAM (41%)

---- NAND Flash (55%)

#### MOS Logic

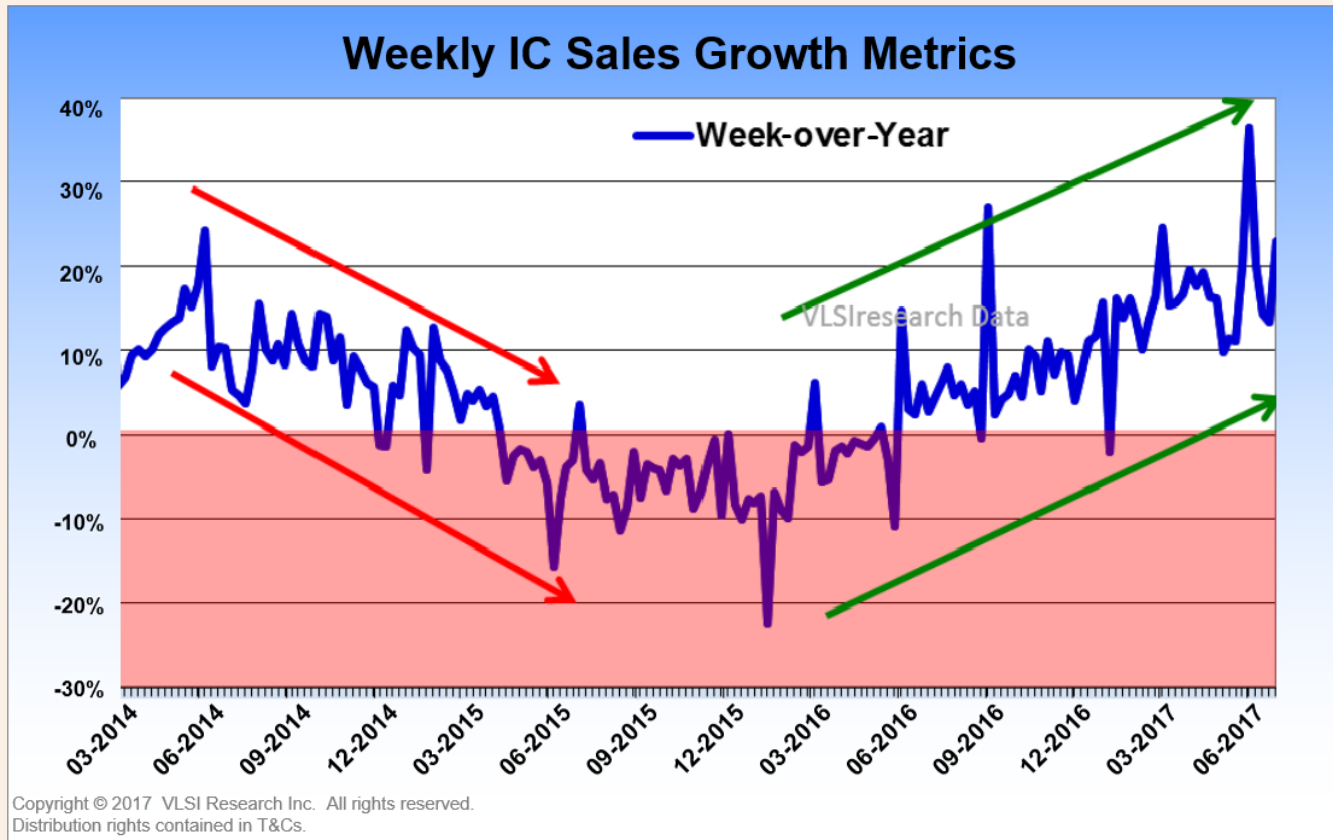
---- MPU (25%)

---- Other Logic (29%)

## 2017 - IC Manufacturing in Good Health

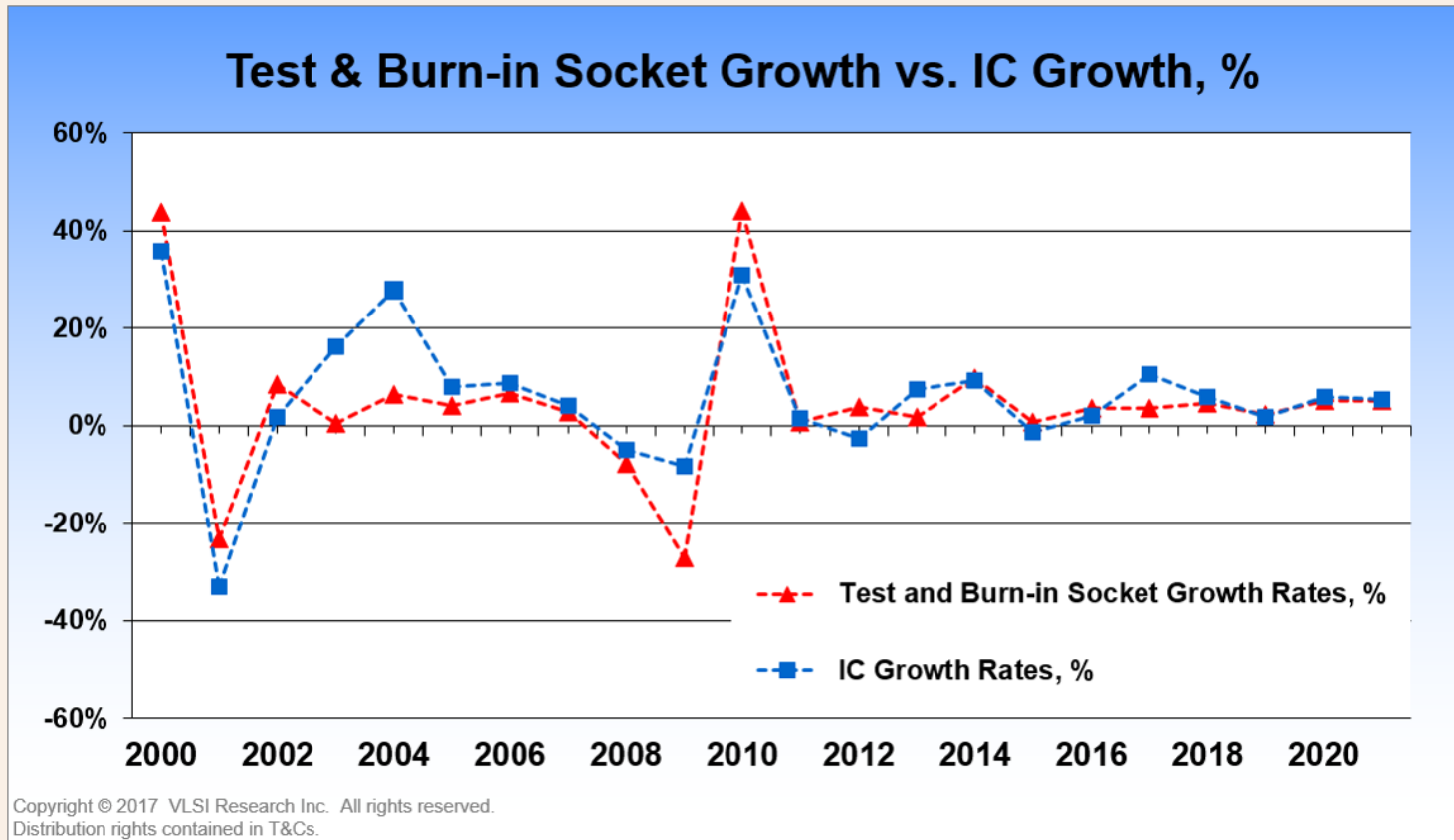
- 5 to 6 weeks inventory – normal
- Inventories are growing, but in line with market size
- Strong chip prices
- High utilization rates

## Week-Over-Year IC Sales Growth Trends



**IC Recovery Started in March 2016**

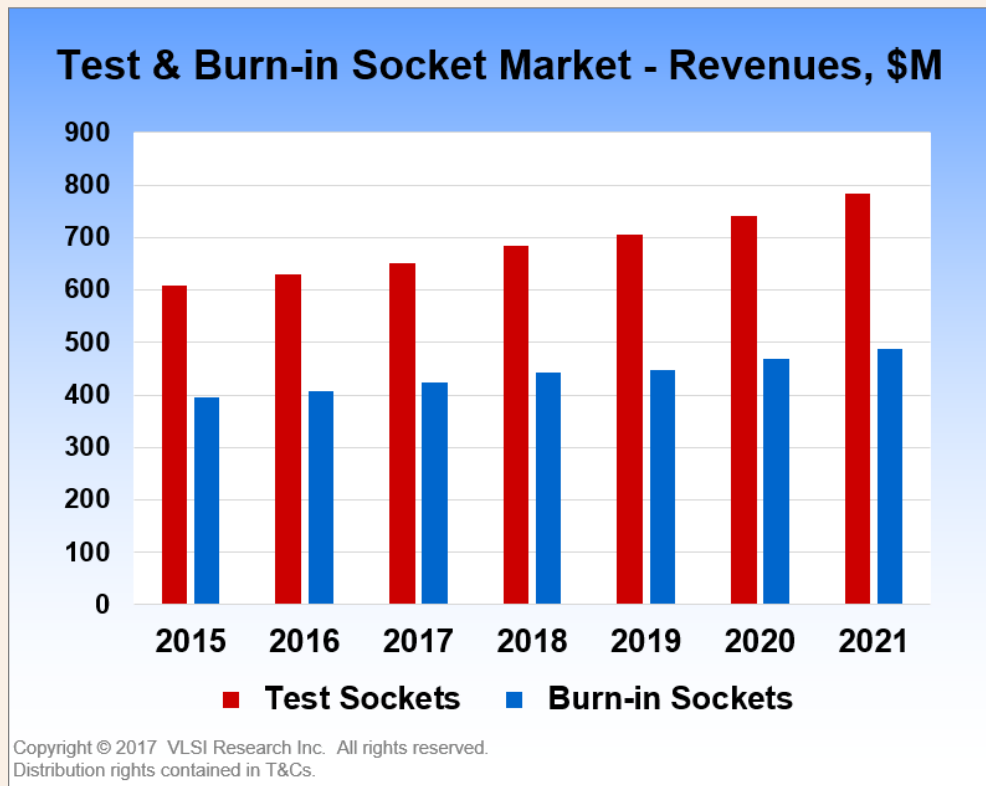
## IC Growth drives test & burn-in Socket Growth



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## Test & Burn-in Socket Market



**Test sockets growing quicker than burn-in sockets**

**Test sockets:**

--- Revenue 16: \$631M

--- CAGR 16-21: 4.4%

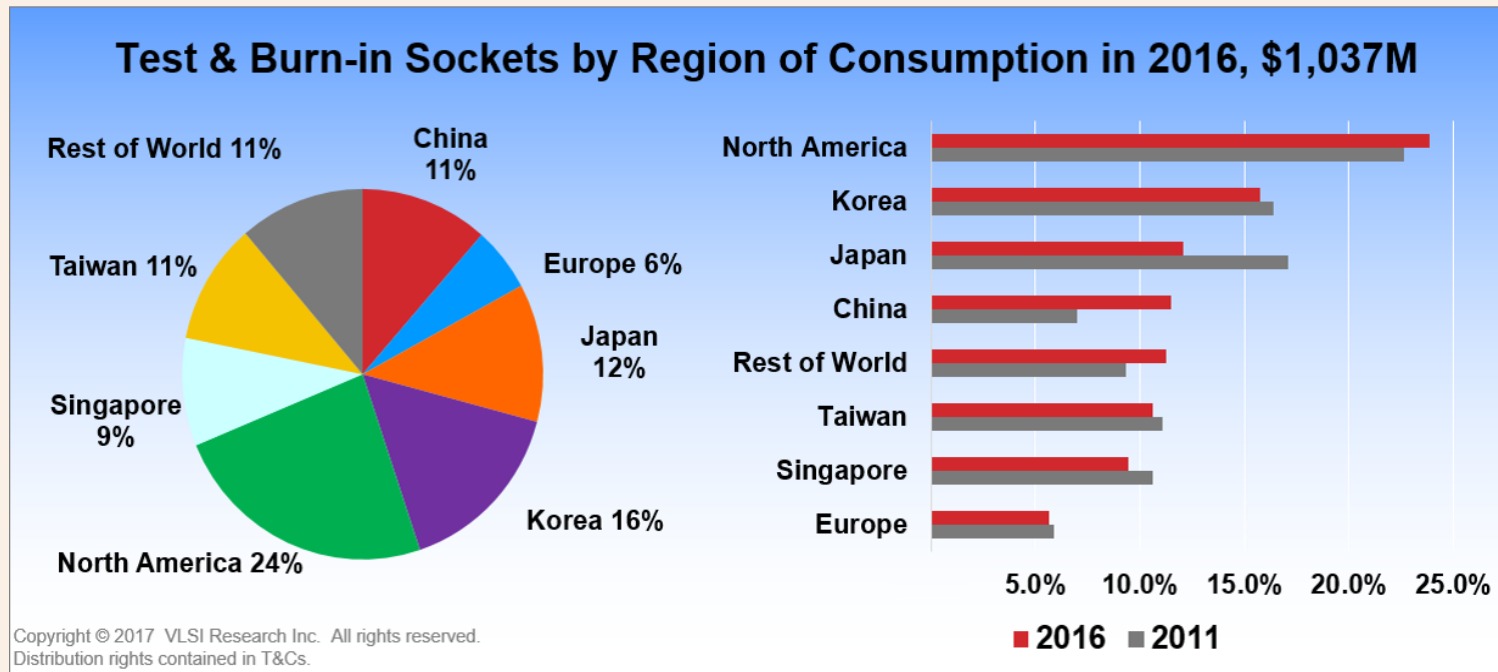
**Burn-in sockets:**

--- Revenue 16: \$406M

--- CAGR 16-21: 3.6%

**Total socket market in 2016: \$1037M**

## Sockets by Region of Consumption



- **China consumed 11% Test & Burn-in Sockets in 2016**
- **Chinese share of market up by 4.5% in last 5 years, and expected to account for 15% to 17% by 2021**



## Global Top 5 Test vendors & Top 5 Burn-in vendors

### Top Test Socket Vendors

- 1 ISC
- 2 Smiths Connectors
- 3 LEENO
- 4 Johnstech
- 5 Xcerra

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Xcerra acquired by a Chinese company in 2017

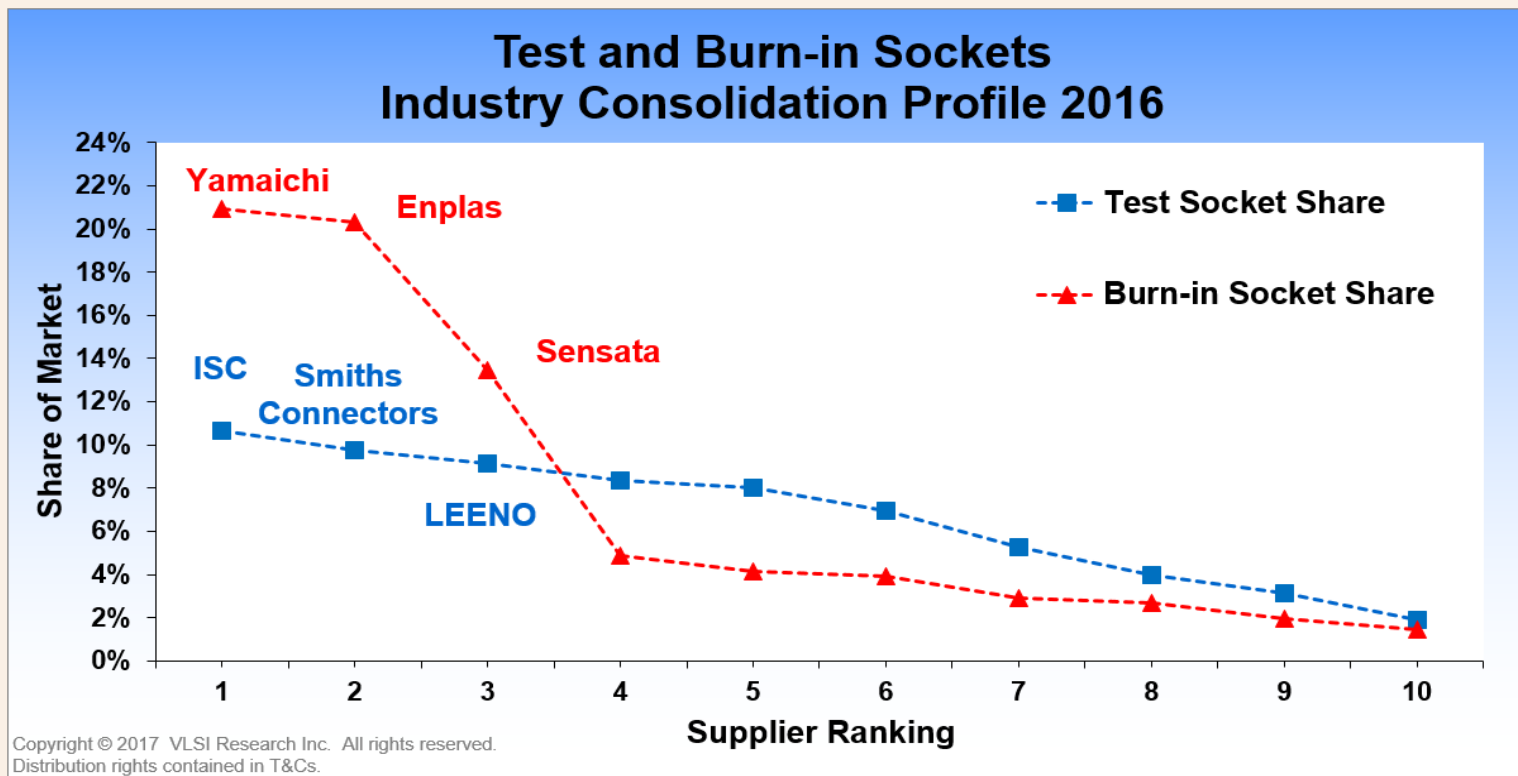
### Top Burn-in Socket Vendors

- 1 Yamaichi Electronics
- 2 Enplas
- 3 Sensata Technologies
- 4 Loranger
- 5 Plastronics

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**Public companies including ISC, LEENO, Yamaichi, Enplas, Sensata, had strong performance in Q1 and Q2 2017. (Q1 2017 revenues for these companies were 15% higher than Q1 2016 revenues)**

## Industry Consolidation in 2016



**Test socket --- fragmented**

**Burn-in socket: concentrated**

**Top 3 burn-in socket vendors owned more than 50% market share**

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  - further development
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  - Top OSATS
  - Chinese socket market / socket vendors
- **Challenges of Chinese semiconductor test market**
  - For local vendors
  - For foreign vendors

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## Chinese Semiconductor Industry and Market Status

- **58.5%** ---- China's share of global semiconductor consumption
- **16.2%** ---- China's share of global semiconductor production
- **7.5%** ---- China's share of global IC design industry
- **13.9%** ---- China's share of global wafer fab capacity
- **715** ---- Number of Chinese IC design enterprises

Data from PwC (China's impact on the semiconductor industry: 2016 update)

## Foreign Investment in China

Company	Type	Layout in China		
		Product Development	Wafer Fab	Package & Test
Intel	IDM	✓	✓	✓
Samsung	IDM	✓	✓	✓
TSMC	Foundry	✓	✓	
Qualcomm	Fabless	✓		✓
Broadcom	Fabless	✓		
SK Hynix	IDM		✓	✓
Micron	IDM	✓		✓
Texas Instruments	IDM	✓	✓	✓
Toshiba	IDM	✓		
NXP Semiconductors	IDM	✓		✓
MediaTek	Fabless	✓		
Infineon	IDM	✓		✓
STMicroelectronics	IDM	✓		✓

Data from IC Insights

## Chinese semiconductor objectives (1)

- **13<sup>th</sup> five-year plan (2016-2020)**

- Wafer Fabrication: 16/14 nm process technology can achieve mass production

- Package and Testing: reach same level with international first-tier factories

- Equipment and Material: enter into international purchasing supply chain

- IC Design: based on the sustainable development of IC design technology in mobile communication and Internet communication, enter into cloud, IoT, big data field



## Chinese semiconductor Objectives (2)

- **Made in China 2025**

----- Global brand owners in semiconductor industry including equipment & material, IC design & manufacture, electronic components and end-user products

----- The "Made in China 2025" clearly outlines that the nation is aiming to raise its self-sufficiency rate for ICs to 40% in 2020 and 70% in 2025

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## Top OSATs

### Top OSATS for 2017 (Provisional Ranking)

<b>ASE &amp; SPIL</b>	<b>Taiwan</b>
<b>Amkor</b>	<b>North America</b>
<b>JCET &amp; STATS ChipPAC</b>	<b>China</b>
<b>Powertech</b>	<b>Taiwan</b>
<b>Tianshui Huatian</b>	<b>China</b>
<b>Tongfu Microelectronics</b>	<b>China</b>
<b>KYEC</b>	<b>Taiwan</b>
<b>ChipMOS</b>	<b>Taiwan</b>

- **JCET acquired STATS ChipPAC in 2016, among the top 3 OSATS**
- **3 Chinese companies among the top 10 OSATS.**

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## Chinese test and burn-in socket market in 2016

- **6% ---- Chinese suppliers' share of global market**

Main sales region: China (>80%), Taiwan and North America

- **\$120M ---- Sockets consumed in China**

65% ---- test sockets (\$78M)

35% ---- burn-in sockets (\$42M)

40% ---- supplied by local vendors

60% ---- supplied by foreign vendors

## Top Chinese local socket vendors

- **TwinSolution:** One of the largest Chinese socket vendors
  - Focus on the high performance test sockets
  - International competitiveness
- **Other top / emerging socket vendors**
  - Kaizhitong Microelectronics (KZT)
  - Junrensi Electronic Technology (JRS)

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## Challenges for local vendors

- **Foreign chipmakers with manufacturing in China still mostly buying sockets from outside China**
- **A small amount of government subsidy or help for Chinese socket vendors**
- **Chinese socket vendors mostly focusing on low-end products**
- **New products with high performance will be necessary for improving competitiveness in both local and international market**



## Challenges for foreign vendors

- **Increased number of purchase decisions will be made by Chinese chip designers and OSATS in next five years**
- **First round competition for close cooperation with Chinese decision makers may be over: long-term relationships may already have been formed and difficult to break**

## Conclusion

- **Chip making in China set to grow - driven by strong global IC market and increased market share**
- **Increased importance of China as a region for semiconductor test**
- **Chinese socket market expected to grow from 11% in 2016 to 15% - 17% in 2021**