AI Revolutionizing Semiconductor Testing

Panchami Phadke
TechInsights

TestConX한국 Korea

Incheon ▪ November 7, 2023

Contents

- Highlights of Semiconductor Market
- Global Probe Card Market
- Test & Burn-in Socket Market
- Device Interface Boards Market
- Introduction to Semiconductor Testing
- Artificial Intelligence Segments
- Role of AI in Semiconductor Testing
- Conclusion

Highlights of Semiconductor Market

TechInsights' Current Forecast										
Forecast as of September 2023:	Q1 2023	Q2 2023	Q3 2023	Q4 2023	2023	Q1 2024	Q2 2024	Q3 2024	Q4 2024	2024
Semi Equipment ($B):	$ 34.8	$ 32.3	$ 32.0	$ 31.4	$ 130.5	$ 32.4	$ 32.9	$ 34.7	$ 35.3	$ 135.2
Sequential Change	-1.2%	-7.2%	-1.0%	-1.8%	-4.9%	3.0%	1.6%	5.5%	1.7%	3.7%
Capacity Utilization:	76.9%	73.7%	75.1%	74.3%	75.0%	78.3%	86.5%	90.1%	84.2%	85.0%
ICs ($B):	$ 102.4	$ 107.9	$ 115.3	$ 120.1	$ 445.7	$ 117.3	$ 120.0	$ 126.1	$ 130.8	$ 494.1
Sequential Change	-8.7%	5.4%	6.9%	4.2%	-13.3%	-2.4%	2.3%	5.1%	3.8%	10.9%
IC Units (BU):	86.9	89.2	85.8	89.1	351.0	86.1	90.9	97.5	104.2	378.6
Sequential Change	-9.7%	2.6%	-3.8%	3.9%	-13.3%	-3.4%	5.5%	7.2%	6.9%	7.9%
Electronics ($B) :	$ 600.5	$ 557.9	$ 597.1	$ 727.8	$ 2,483	$ 610.3	$ 583.2	$ 630.7	$ 779.0	$ 2,603
Sequential Change	-13.5%	-7.1%	7.0%	21.9%	-2.8%	-16.1%	-4.4%	8.1%	23.5%	4.8%

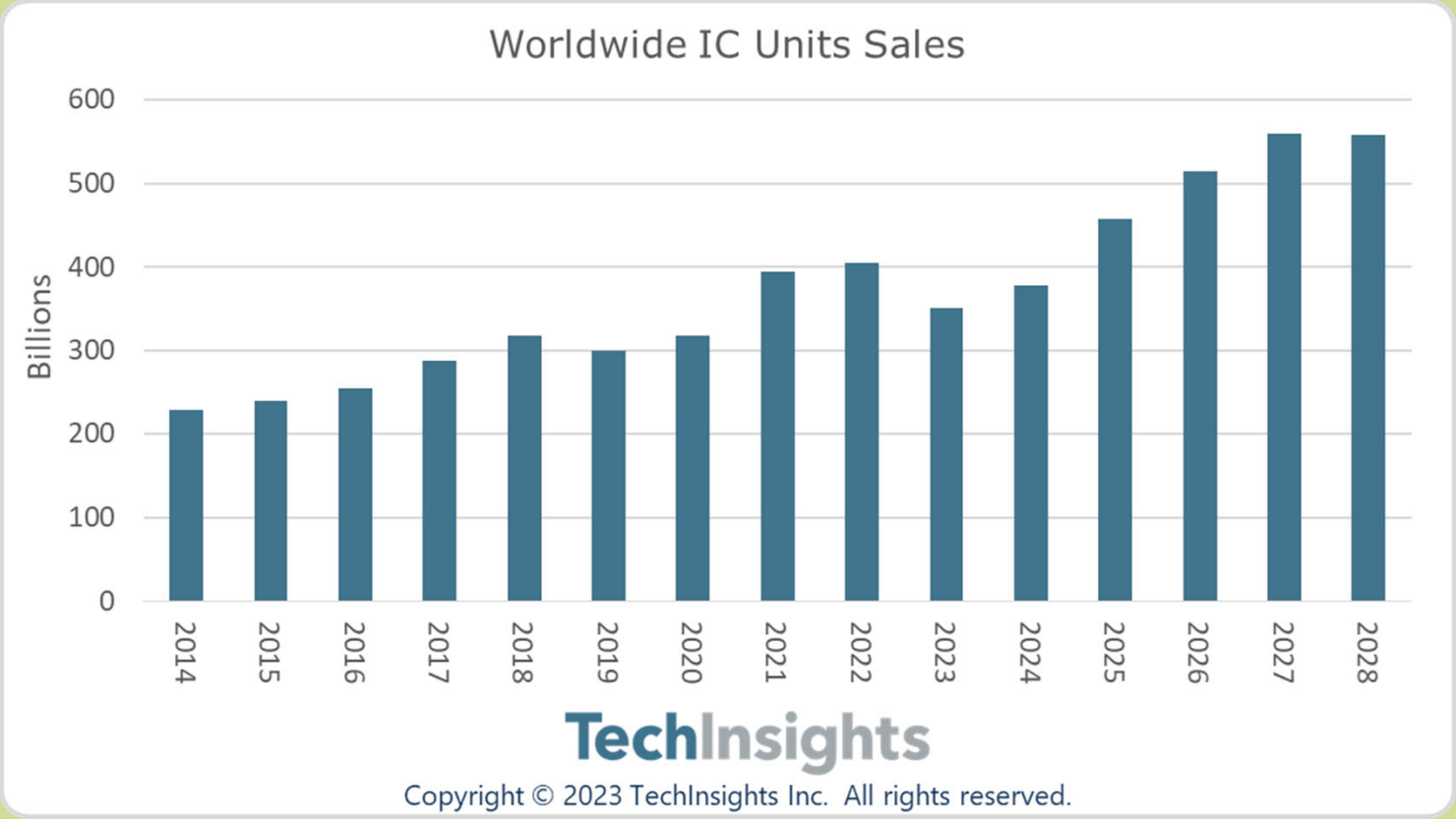
TestConX한국 Korea

AI Revolutionizing Semiconductor Testing

2023

3

Highlights of Semiconductor Market



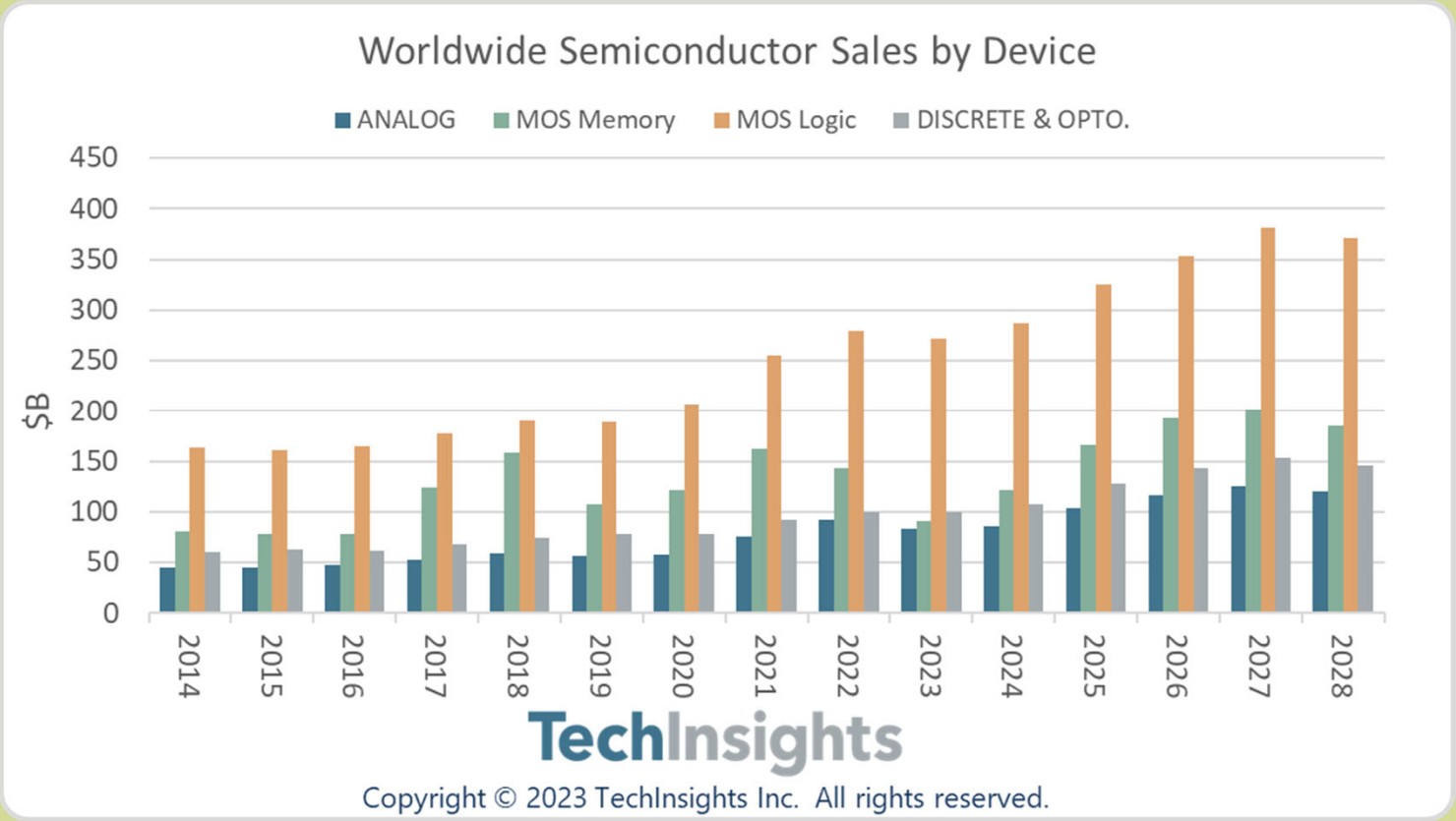
TestConX 한국 Korea

AI Revolutionizing Semiconductor Testing

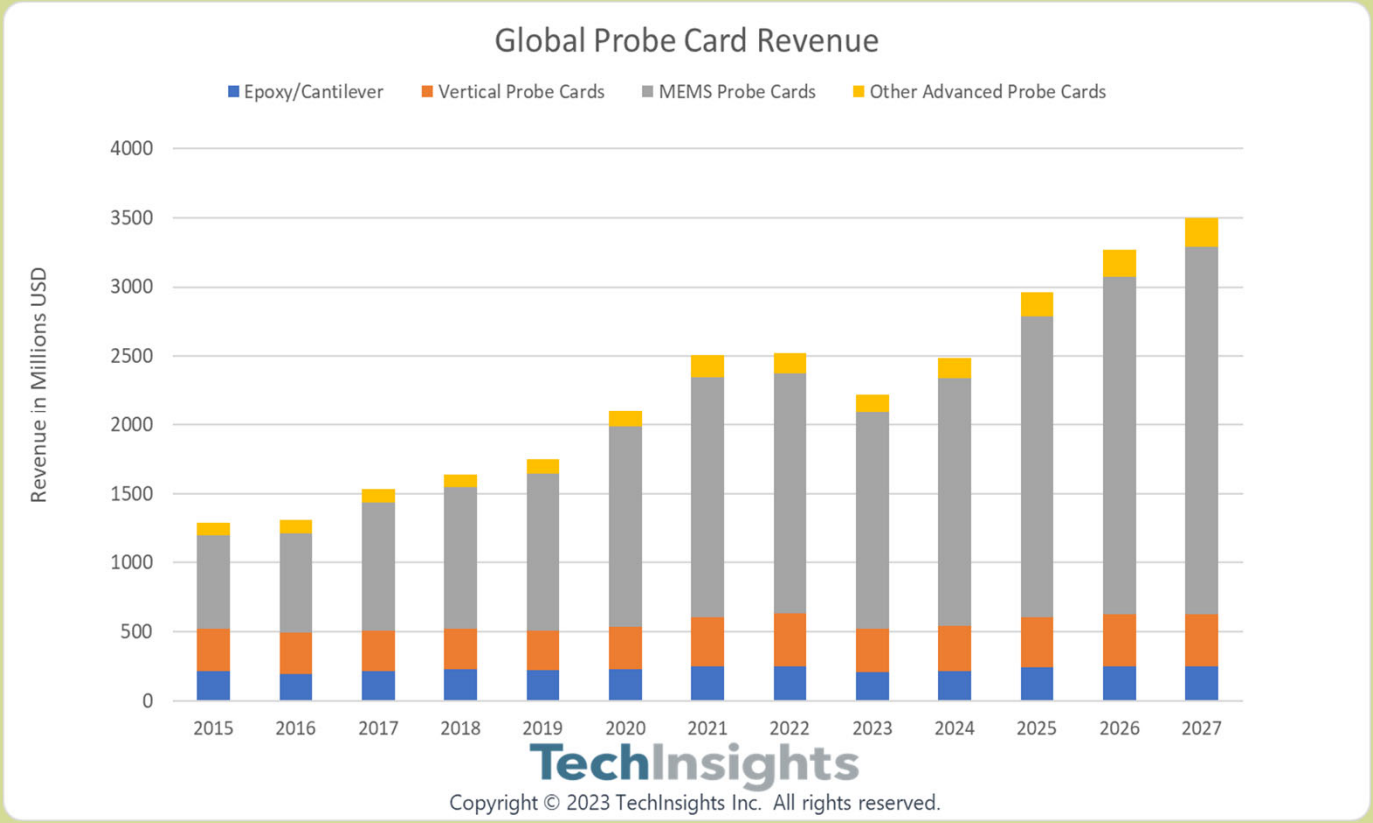
2023

4

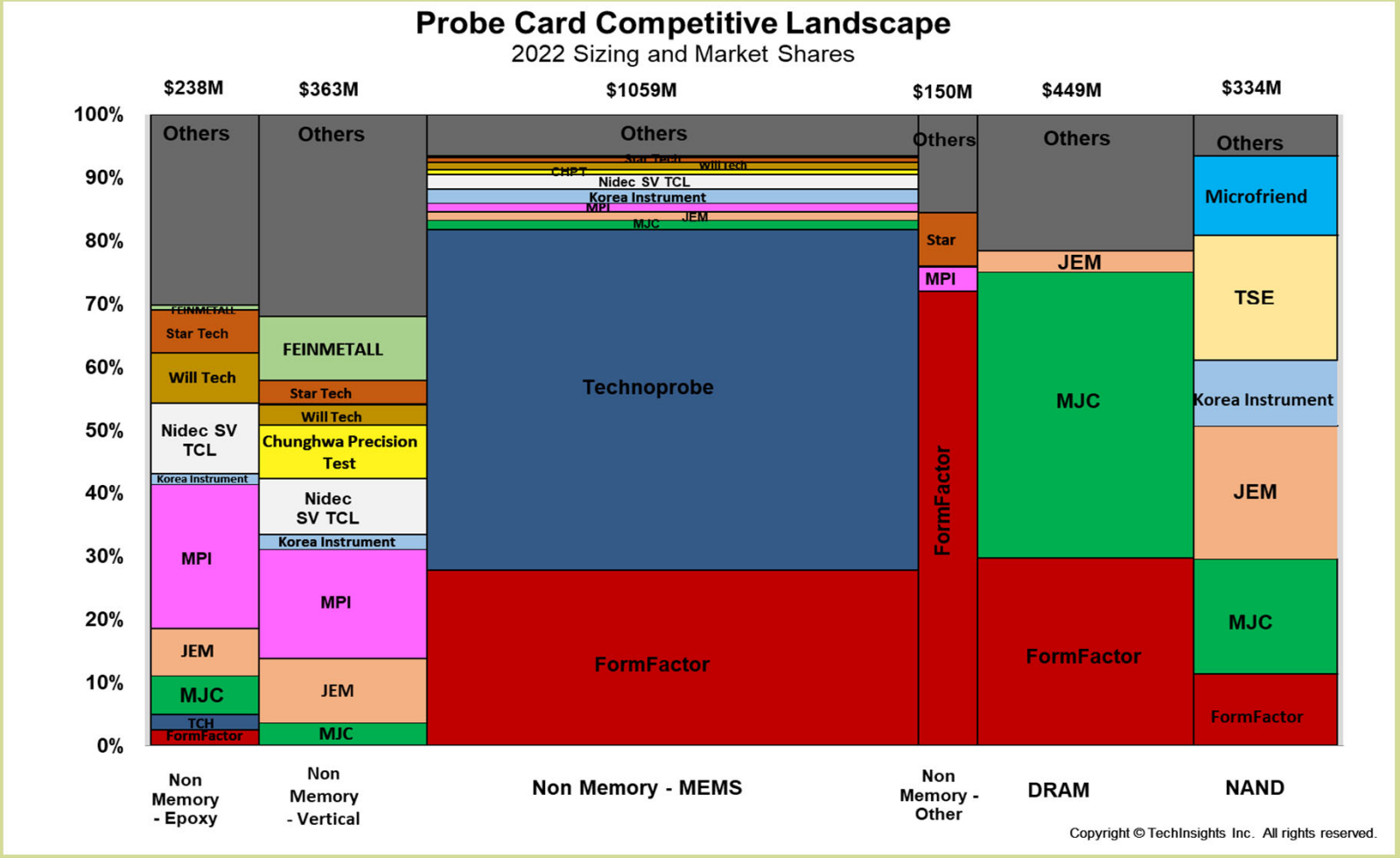
Highlights of Semiconductor Market



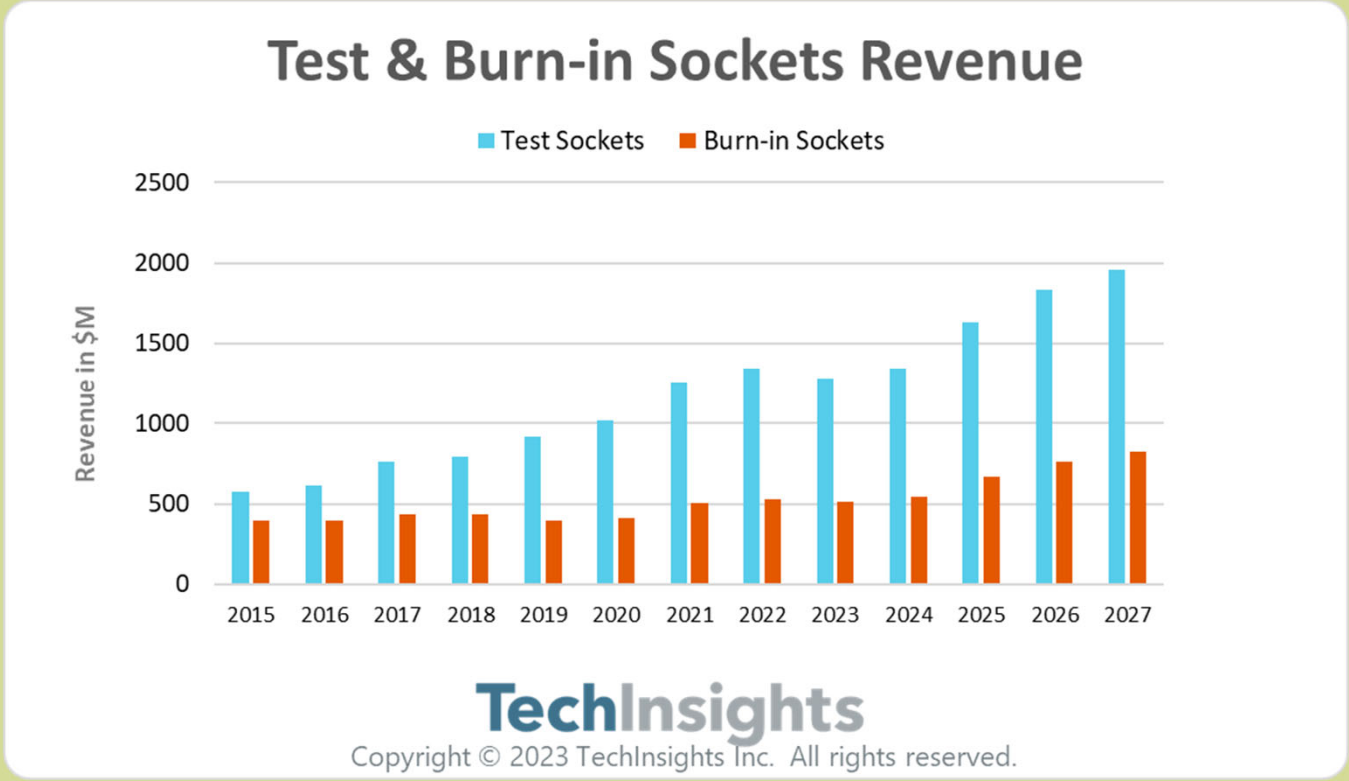
Global Probe Card Market



TestConX Korea 2023



Test & Burn-in Socket Market



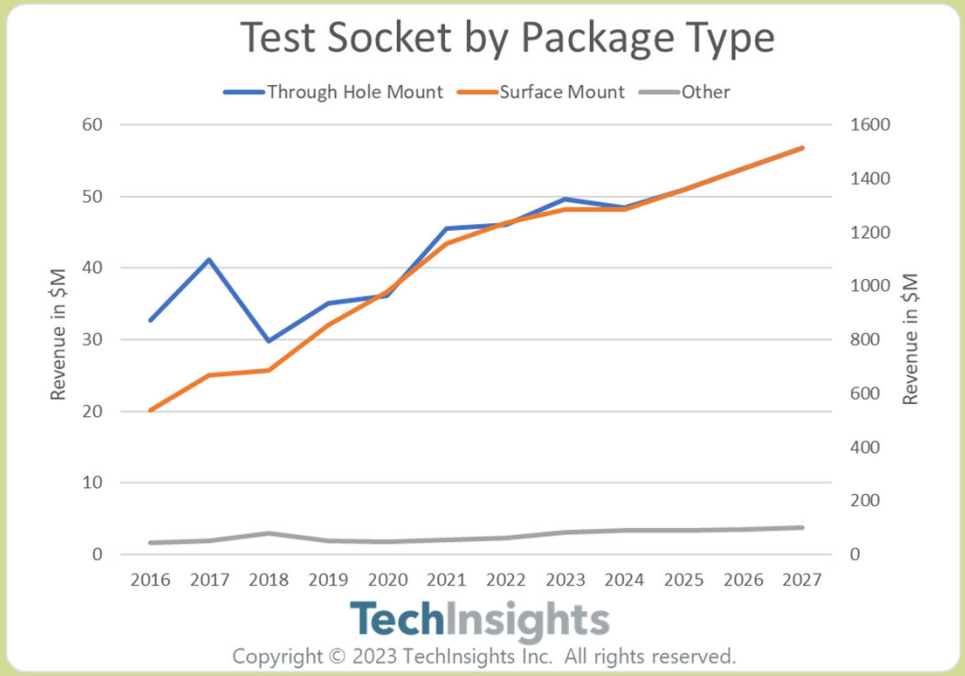
TestConX 한국 Korea

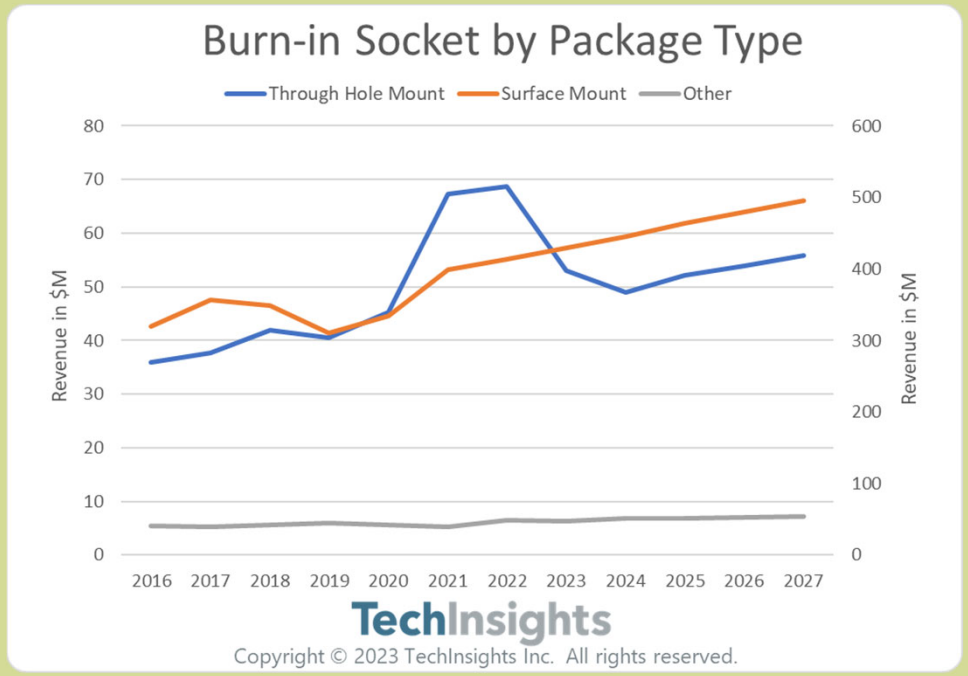
AI Revolutionizing Semiconductor Testing

2023

8

Test & Burn-in Socket by Package Type





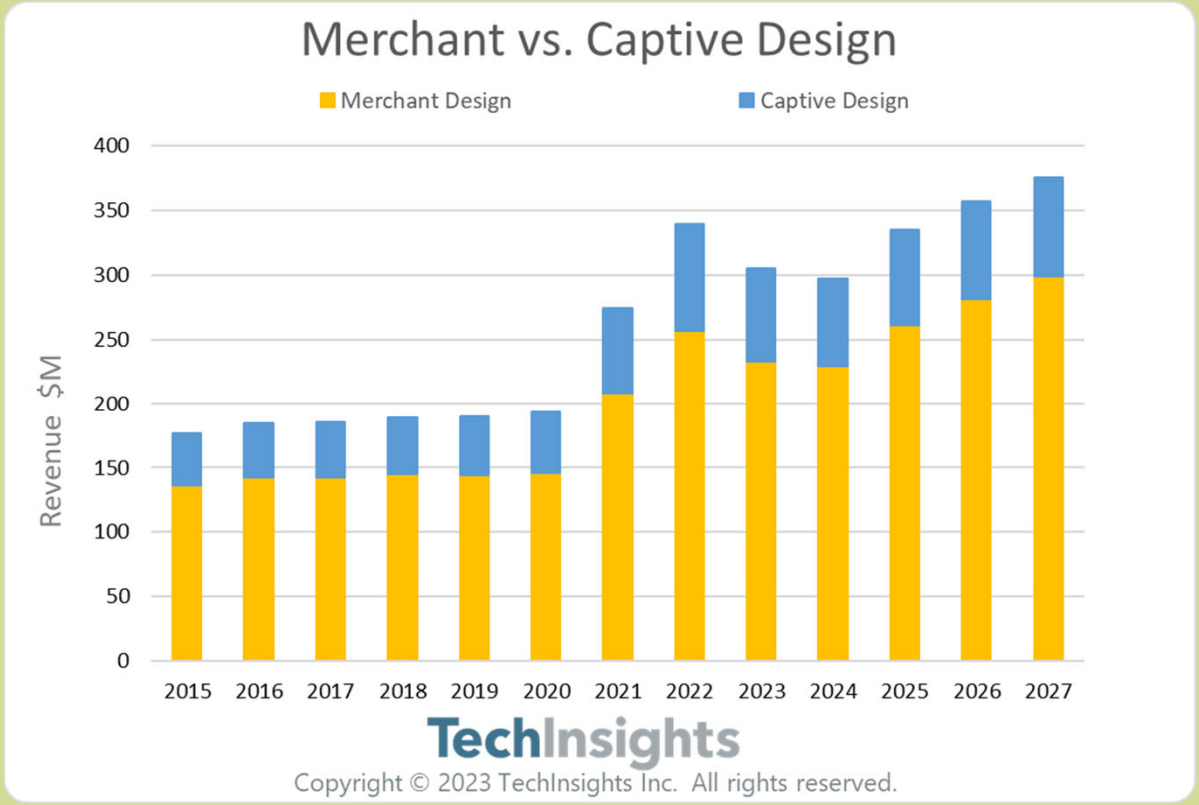
TestConX 한국 Korea

AI Revolutionizing Semiconductor Testing

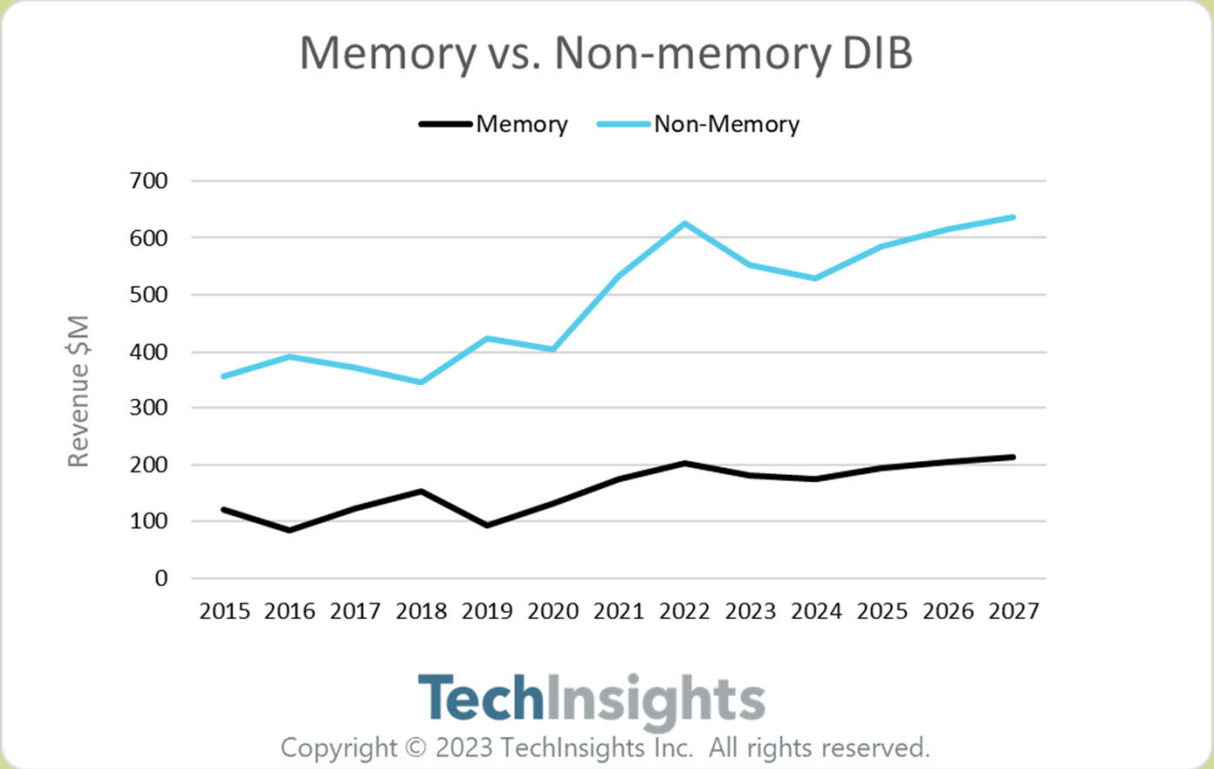
2023

9

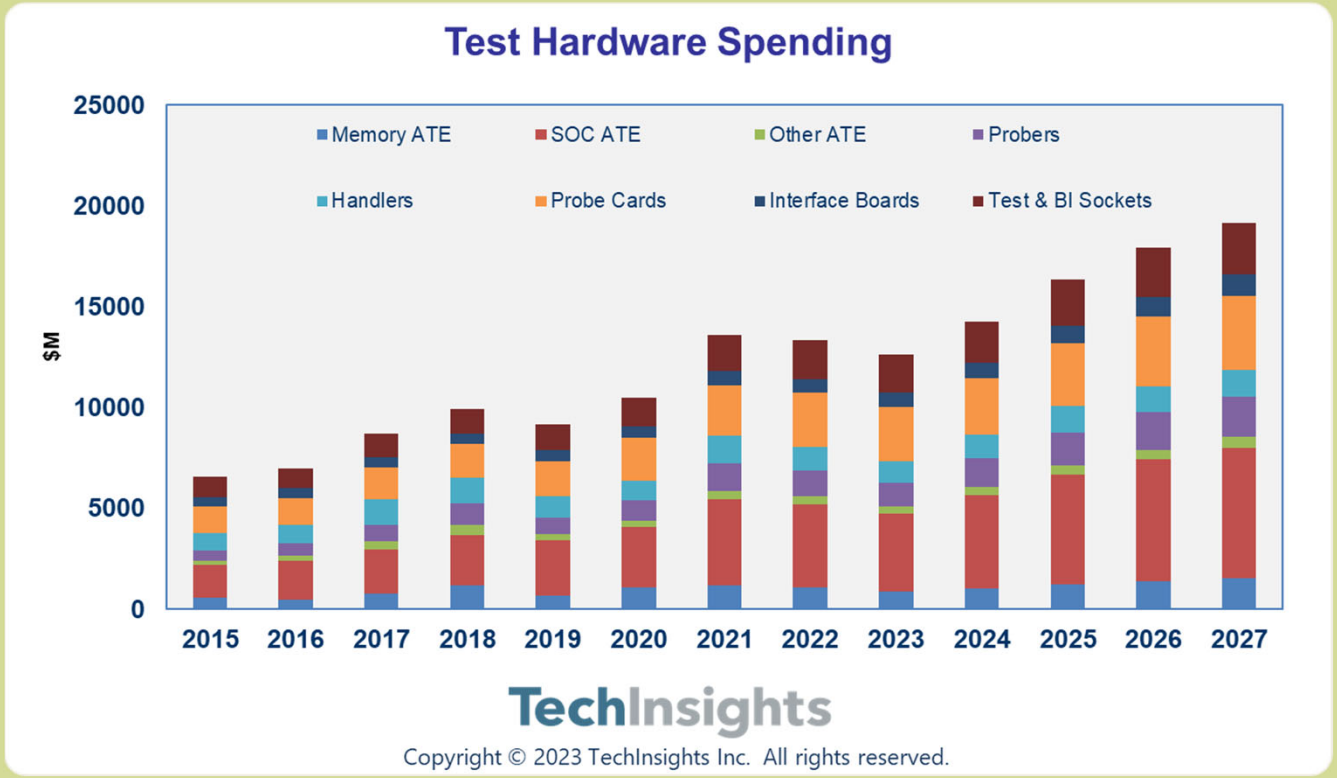
Device Interface Board Market



Device Interface Boards by Application



Introduction to Semiconductor Testing



TestConX 한국 Korea

AI Revolutionizing Semiconductor Testing

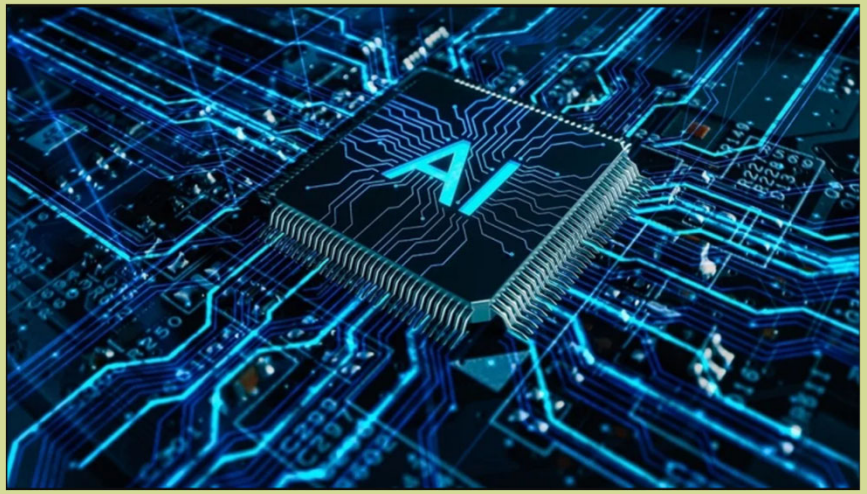
2023

Introduction to Semiconductor Testing

- Crucial step in Semiconductor manufacturing process
- Various types at different stages of manufacturing
- Key types are-
  - Wafer Testing (Wafer Probing)
  - Final Test (Final Package Testing)
  - Parametric Testing
  - Functional Testing
  - Burn-in Testing
  - Automated Test Equipment (ATE)

AI and Semiconductor Testing

- Forecasted to reach $3B by 2027, growing at CAGR 20%
- Increase Semiconductor revenue by 12% by 2025
- Cut production costs by 11% by 2025
- Boost productivity by 30% by 2027
- Reduce worldwide energy consumption by 10% by 2030



TestConX한국 Korea

AI Revolutionizing Semiconductor Testing

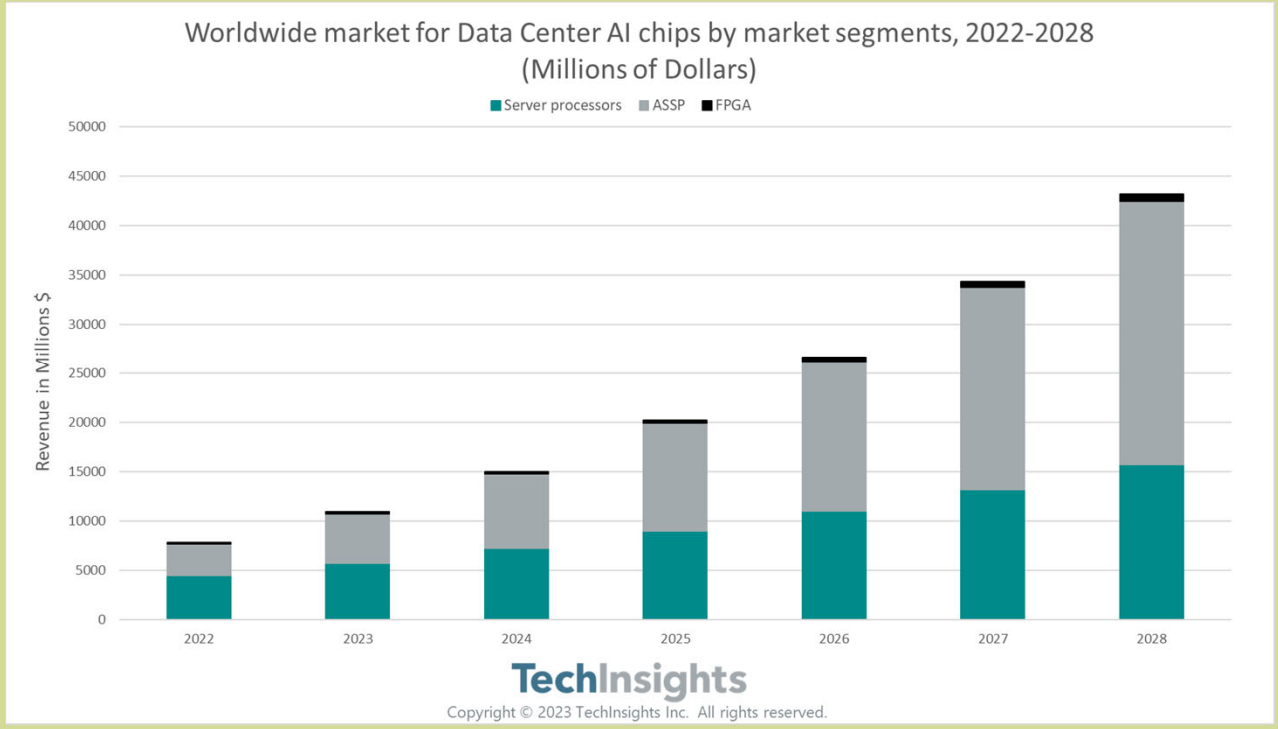
2023

14

Artificial Intelligence Segments

Data Center AI Chips

- Server Processors
- ASSP
- FPGA



TestConX 한국 Korea

AI Revolutionizing Semiconductor Testing

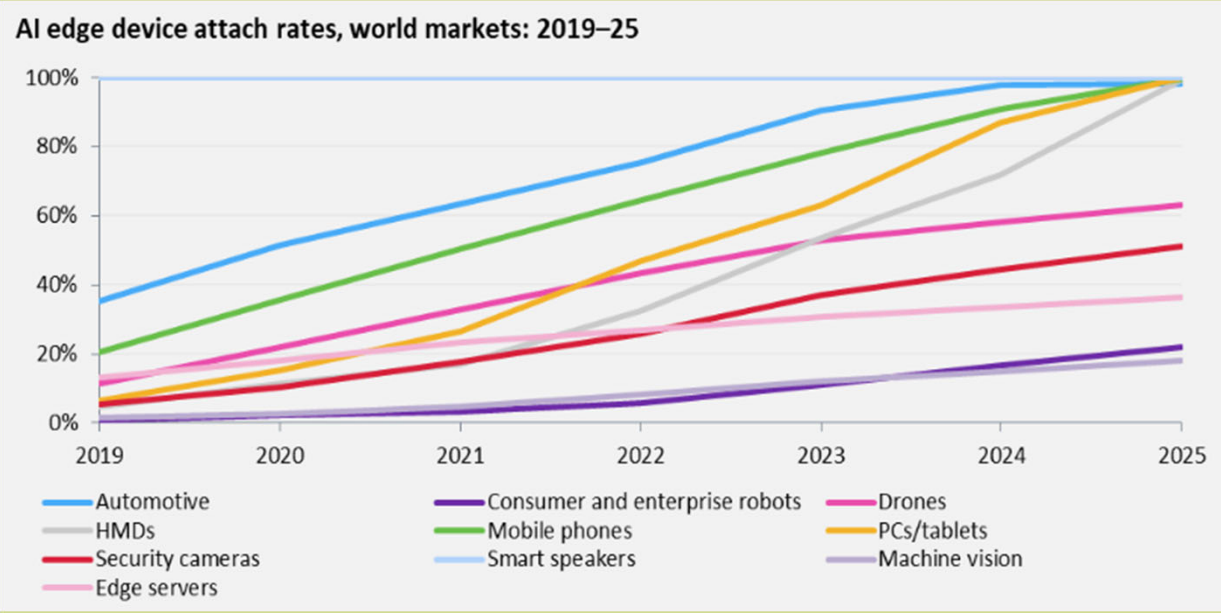
2023

15

Artificial Intelligence Segments

Edge based AI Chips

- Automotive
- Security Cameras
- Cell phones, PC, Tablet
- Smart speaker
- Drones, Robots
- HMDs, Edge servers



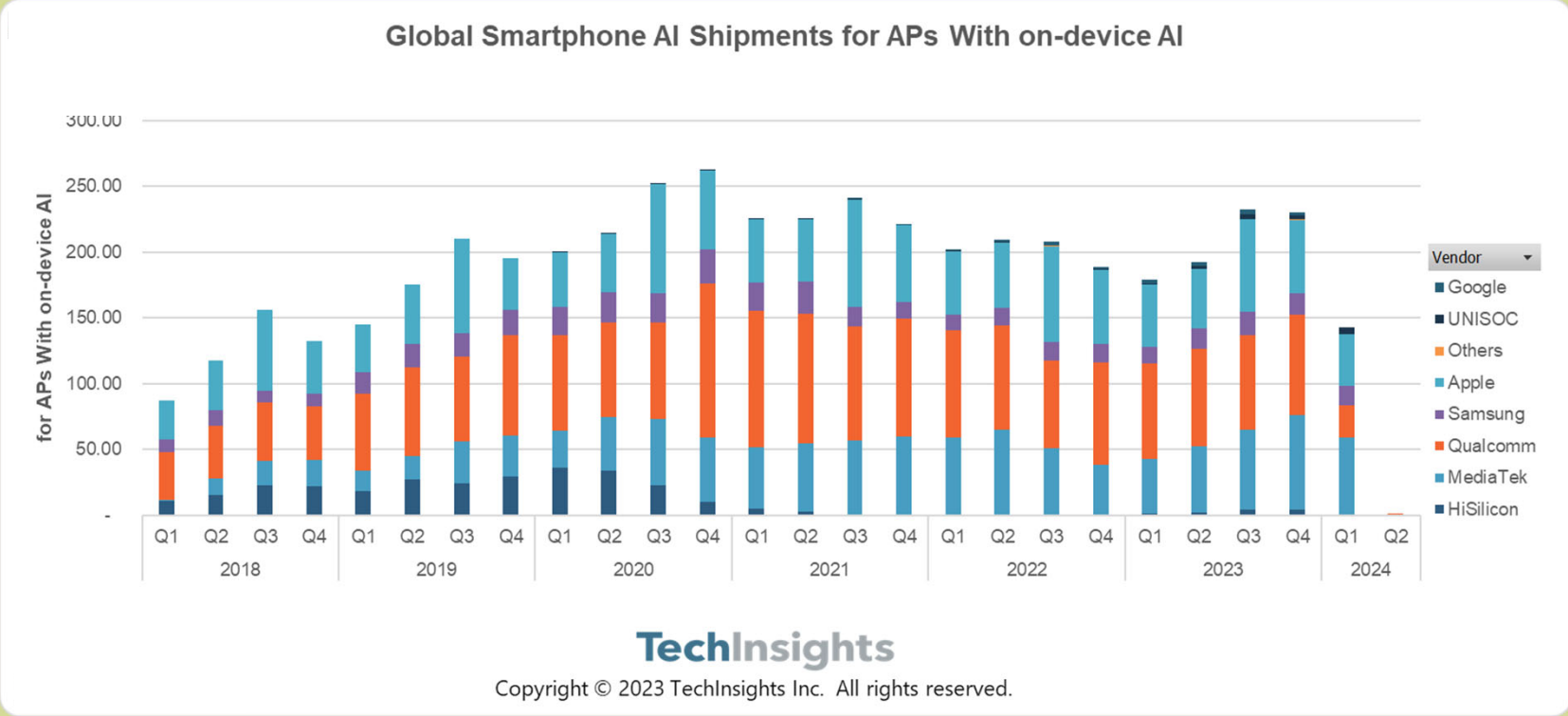
TestConX 한국 Korea

AI Revolutionizing Semiconductor Testing

2023

16

AI Chip Market Share Tracker



TestConX한국 Korea

AI Revolutionizing Semiconductor Testing

2023

17

Role of AI in Semiconductor Testing

- Test Pattern Generation
- Yield Enhancement
- Test Time Reduction
- Data Analysis
- Fault Classification
- Defect Detection
- Predictive Maintenance
- Adaptive Testing
- Quality Control
- Adaptive Testing for Emerging Technologies

TestConX 한국 Korea

AI Revolutionizing Semiconductor Testing

2023

18

AI Powered Innovations in Probe Cards

- Reduced Test time
- Predictive Maintenance
- ML for Alignment and Automatic Calibration
- Pattern Recognition
- Real-time Monitoring and control
- AI assisted Data analysis
- Remote Troubleshooting

Conclusion

- Probe Card CAGR is 9.2% from 2022 to 2027
- Sockets CAGR is 8% from 2022 to 2027
- DIB CAGR is 7.9% from 2022 to 2027
- Semiconductor testing is the critical part of Semi manufacturing process
- AI leads to paradigm shift in Chip design, manufacture, testing and power management

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.
- There is NO copyright protection claimed by this publication. However, each presentation 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.