



# **AEHR** **TEST SYSTEMS**

**Setting the Test Standard for  
Tomorrow**

*Nasdaq: AEHR*

# Forward Looking Statements

---

*This presentation contains forward-looking statements that involve risks and uncertainties relating to projections regarding industry growth and customer demand for the Company's products. Actual results may vary from projected results. These risks and uncertainties include without limitation, acceptance by new customers of the FOX™ wafer level burn-in and test system, world economic conditions, the Company's ability to maintain sufficient cash to support operations, and the potential emergence of alternative technologies, which could adversely affect demand for the Company's products in fiscal year 2024. See the Company's recent 10-K and 10-Q reports filed with the SEC for a more detailed description of the risks facing the Company's business. The Company disclaims any obligation to update information contained in any forward-looking statement to reflect events or circumstances occurring after the date of this presentation.*

# Presenting Today

---



**Gayn Erickson**  
CEO, Aehr Test Systems

# Update on Fiscal Year 2023 Financials

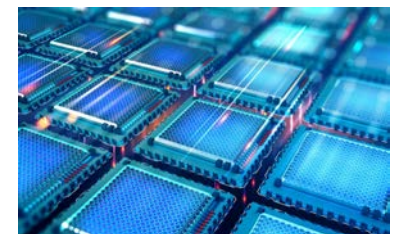
---

- Aehr completed its FY23 fiscal year May 31, 2023
- Aehr will report our FQ4 and year end earnings on July 13, 2023
- Aehr forecasted that we would finish the year with revenue for the fiscal year of at least \$60 million to \$70 million (up 18% to 38% over last fiscal year) which is record annual revenue even at the low end
- Aehr had not forecasted bookings for the year, but Aehr had already exceeded all of last year's record annual bookings by the end of our 3rd quarter, so Aehr will clearly set a new bookings record for the company
- Aehr was within \$1 million of last year's entire year GAAP earnings by the end of Q3, so with the forecasted revenues for fiscal Q4 and a conservative net profit on revenue, Aehr will clearly grow net profit and GAAP earnings at a higher percentage than our revenue growth.

# Aehr Test Systems Market Drivers

Need for cost-efficient wafer level and singulated die burn-in, stabilization, & testing are creating significant revenue opportunities for Aehr Test in the following key markets

- **Electric Vehicle & Electrification of Transportation Infrastructure** driving motor control, charging infrastructure, and power conversion using **Silicon Carbide & Gallium Nitride semiconductors**
- **Electrification of the World's Power Infrastructure and Shift to Clean Energy** driving efficient and economical electrical power conversion using **Silicon Carbide & Gallium Nitride semiconductors**
- **Data Center Infrastructure** and unstoppable growth in **Data Storage** driving **Silicon Photonics, Flash Memory Based Solid State Data Storage**, and new **Photonics Assisted Hard Disk Drive Storage**
- **Worldwide 5G Infrastructure** build out using **Silicon Photonics** fiber optic transceivers and new **Optical Network Switches**
- **Datacenter, Healthcare, Robotics and Generative Artificial Intelligence** applications driving exponential increase in data I/O exceeding the limits of electrical signal bandwidths driving **Silicon Photonics I/O** using CoPackaged/Heterogeneous Integrator/Multi-Chip Module Integration
- **Heterogeneous Integration of semiconductors** and **3D fabrication and stacking** driving technology and cost roadmaps pushing known good die with test and burn-in of device in wafer form prior to packaging



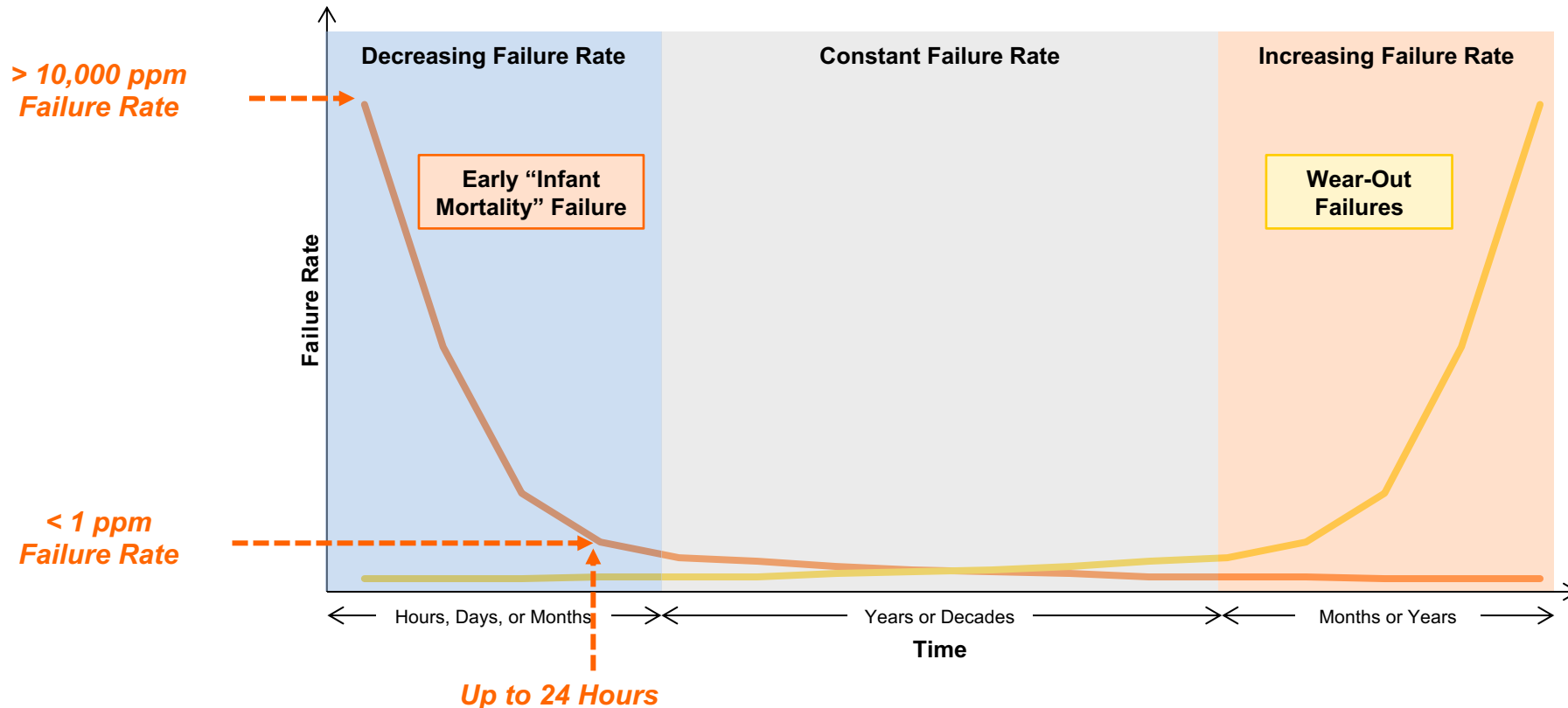
# Update on Silicon Carbide Burn-in Market

---

- Aehr is well on way to becoming the industry standard for a critical manufacturing step for silicon carbide power semiconductors used in electric vehicle traction inverters that power EV engines.
- Aehr's FOX multi-wafer test and burn in systems with proprietary WaferPak full wafer contactors provide enabling technology for adoption of new silicon carbide devices and modules used in EVs
- Aehr added 4 new silicon carbide customers in the last year and is currently engaged with all major players in the market including over a dozen companies entering the market.
- Aehr is expecting a significant market share in a market growing 30-40% CAGR through end of the decade or longer

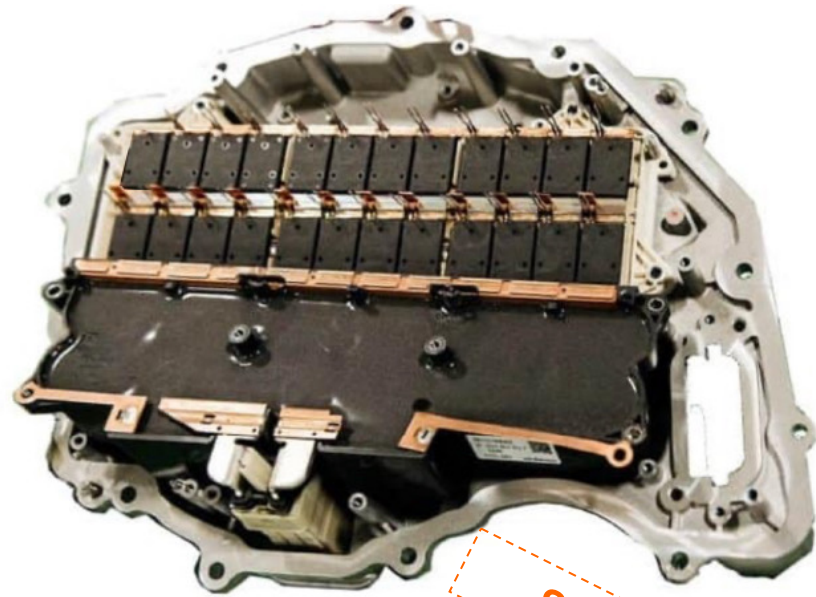
# Burn-in Testing – The Bathtub Curve

## Example Silicon Carbide Failure Rate

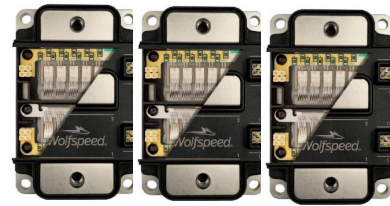


- **Burn-in:** A functional test in which electronic components are subject to elevated voltages and/or temperatures for a duration of time (2 – 48 hours) to screen for reliability and early failure
- Burning-in components exposes them to a high-stress level and screens out "Infant Mortality" failure in electronic components prior to the components making it into a module

# SiC and Multi-Die Packages / Modules



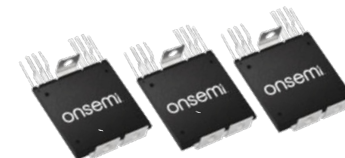
Tesla Traction Inverter  
with 24 2-die modules



Lucid Traction Inverter  
with 3 10-die modules

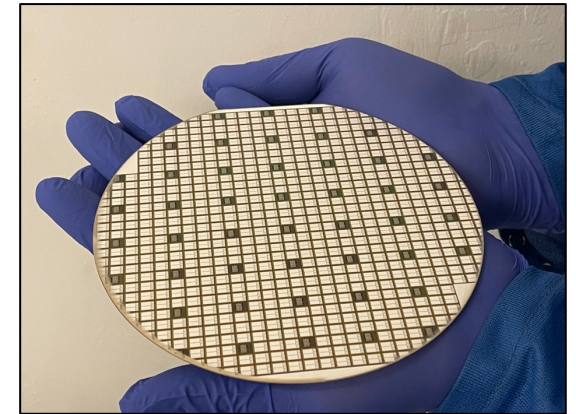


Onsemi Traction Inverter  
with 1 24-die module



Onsemi Traction Inverter  
with 3 8-die modules

Package/Module yield loss  
cost much greater than cost  
of wafer level burn-in



*Silicon Carbide 3-Phase EV Traction Inverter Integration*

# FOX-XP Multi-Wafer Production Test & Burn-In System



FOX-XP 18 Wafer SiC Test & Burn-In System  
configured for SiC Gate Stress Test

- **9 / 18 Wafer System for High Volume Production**
  - 100% compatible using the same Blade resources as FOX-NP
  - Configurable for Gate, Drain, and Body Diode Stress tests
  - Integrated standard 20°C to 150°C thermal control unit
- **FOX WaferPak Contactors**
  - Robust full wafer contactor with >> 100,000 cycle life
  - Very high compliance / robust micro pogo pins
  - Offline or online wafer alignment via Aehr proprietary WaferPak aligners

# Aehr Wafer Level Test & Burn-in Patents



- WaferPak temperature control methods
- Vacuum & pressure-based WaferPaks
- Maintaining probe contact over temperature
- Electrical components in WaferPak
- Individual DUT power supplies
- Per Die Current Protection
- Redundant power supplies
- Portable WaferPaks
- And more . . .

# Proprietary Wafer Level Enabling Technology

- Aehr's FOX-XP is capable of both functional burn-in and test solutions – leverages proprietary aligner and contactor technology
- Multi-wafer technology enables customers to achieve an overall decrease in test equipment cost and fab footprint – while increasing die yield and throughput

## MULTI-WAFER TESTER



**FOX-XP Multi-Wafer Test System**

- May be configured with up to 18 Blades, enabling 18 wafers to be tested in parallel – driving cost efficiency and throughput
- High performance thermal chucks allow uniform temperature control of the wafers
- Footprint similar to single wafer automated test equipment – reducing lab test space

## CONTACTOR



**FOX-XP WaferPaks**

- Houses the wafer and distributes signals and power to the wafer itself
- The WaferPak contactor is capable of over 50,000 contacts in a single touchdown on up to 300mm wafers
- Consumable input into the test system driving recurring revenue from the installed base

## ALIGNER



**FOX WaferPak Aligner**

- Integral piece of test cell as it loads the wafer in the WaferPak at immense levels of precision
- By perfectly setting the wafer in a cartridge it ensures perfect contact
- Performs wafer alignment “offline” which eliminates the need for one wafer prober per wafer during long burn-in and test times

# Testing without Compromise

## Reliability, Stress, and DFT Testing without compromise

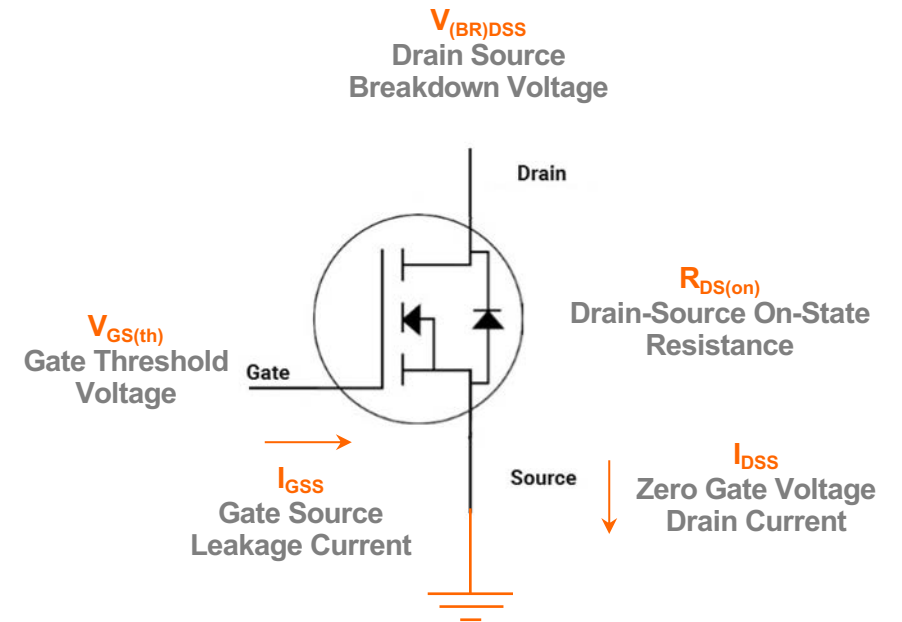
- Solutions for **package parts, modules, panels, or wafers** allow testing at optimal process point
- **Confirm** which devices received desired test with **per device measurements, monitoring, & feedback**
- **100% traceability** with die location (wafer) or device ID read back (module) and electronic tracking ensures knowledge of “good” devices
- Thermal range, uniformity, and capacity permit **reduced test times & confidence** in target **test conditions**
- Vast system resources allow for minimal sharing (**higher sample size, higher yields, fewer hostage failures**)
- **Economical solutions** and **customizations** allow required testing to be performed at the **lowest cost**

# Critical SiC MOSFET Parameters & Stress Tests

Higher than acceptable extrinsic (infant mortality) failure rates of silicon carbide MOSFETs require 100% production stress / burn-in testing to achieve automotive and industrial quality levels

## Example Stress / Burn-in Tests

- **Positive Gate Stress (HTGB+)**
  - Positive Gate Voltage ( $V_{gs}$ )
- **Negative Gate Stress (HTGB-)**
  - Negative Gate Voltage ( $V_{gs}$ )
- **Drain Stress (HTRB)**
  - Positive Drain Voltage ( $V_{ds}$ )
- **Body Diode Stress**
  - High Current Source from Source to Drain



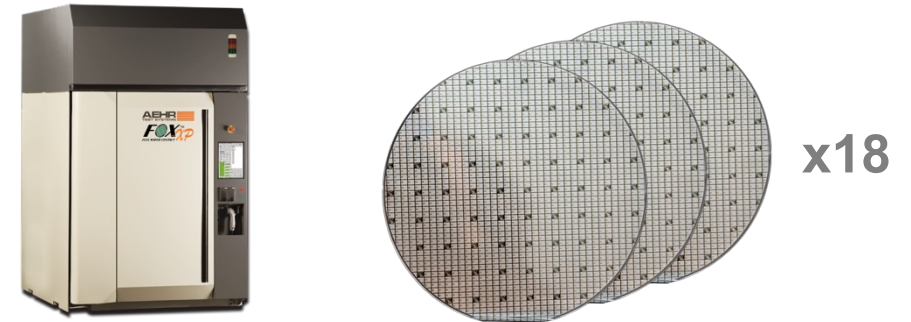
# Package Part vs Wafer Level Burn in

## Package / Module Part Burn-in



- Up to ~ 2,500 SiC devices per system
- Individual device handling with limited life sockets and scrub marks on device leads
- Convection Thermal Control (Oven)
- Equipment depreciation cost of ~ \$0.01 per hour burn-in cost (fixed with standard discrete packages)

## Wafer Level Burn-in



- Up to ~ 45,000 SiC devices per system
- 1000s of devices handled at a time with micro-pogo contact to die >> 100,000 cycle life
- Conduction Thermal Control (Thermal Chuck)
- Equipment depreciation cost of ~ \$0.01 per hour burn-in cost (typical 500 die per wafer inverter MOSFET) and ~ \$0.002 per (2500 die per wafer charger or photovoltaic application MOSFET)

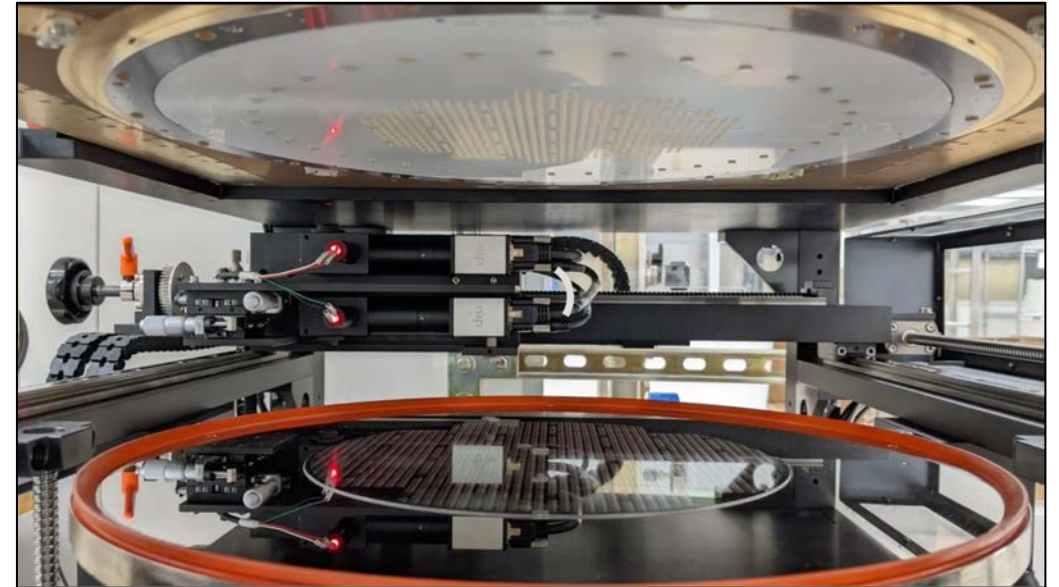
# Update on Gallium Nitride Burn-in Market

---

- Engaged with multiple large and small semiconductor companies developing GaN based MOSFETs for electrification infrastructure used in AC to DC and DC to AC power conversion
- GaN expected to grow enormously moving forward as it is faster, more effective, and has lower power losses than traditional silicon-based power semiconductors
- Markets such as photovoltaic (solar) power converters and consumer electronic power adapters are major market segment targets for GaN
- Solar and automotive and industrial applications appear to require additional stress tests and burn in to meet the critical quality and reliability and this appears to be a significant market opportunity for our products especially our newly introduced very high voltage option that we began shipments on in FY24 and have just recently received final acceptance from multiple customers for production use in their products.

# Update on Silicon Photonics Burn-in Market

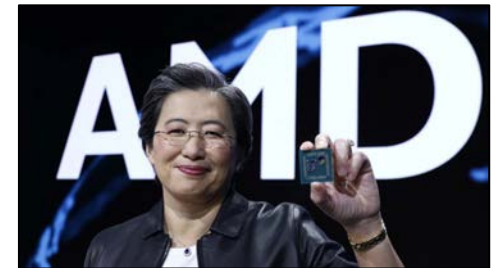
- In FY23, we saw Silicon Photonics begin to recover after a low spell during the Pandemic
- Particularly excited about recent order for new higher power production system capable of testing and burning in up to 3.5 kW per Wafer on the 9 Wafer FOX-XP Test and Burn-in System. (Shipping CQ1'24)
- Optical I/O has the potential to be a game changer for semiconductors as it breaks the bottleneck of data transmission bandwidth limitations of electrical I/O



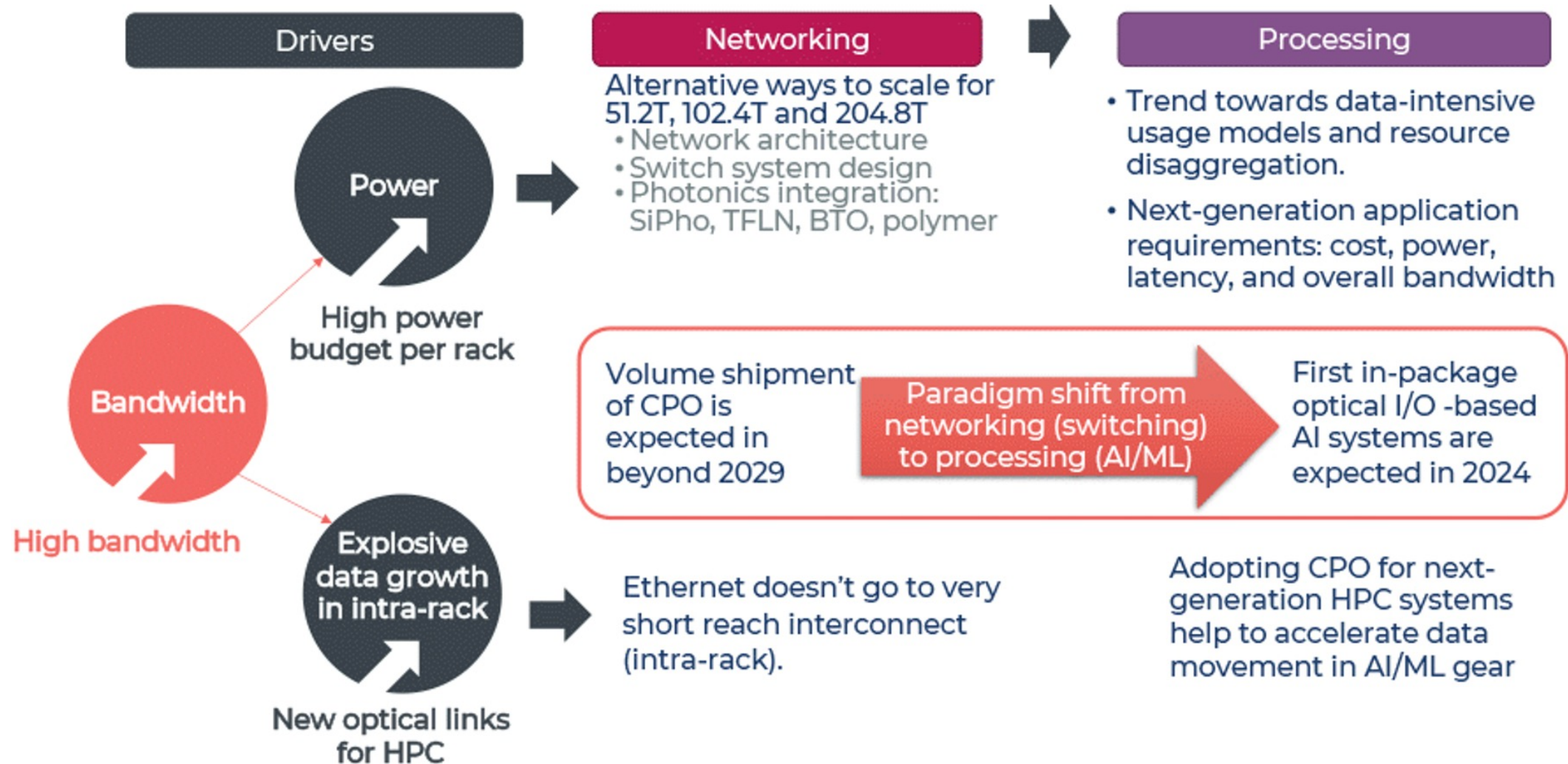
FOX-XP WaferPak  
with 8" Silicon Photonics IC Wafer  
<https://www.skorpiosinc.com>

# Optical I/O is Coming...

- “It was never about just ... transceivers, it was about the learning curve because we knew that, down the road, optics needed to be co-packaged with Ethernet switches. And it will eventually be integrated with the CPU or XPU as well.” – Robert Blum, Senior Director of New Business and Marketing, Intel, May 2021
- “Intel announces silicon photonics advancement towards optical I/O” – Venturebeat, June 2022
- “Nvidia and TSMC working on multi-GPU solutions based on silicon photonics, latency data transmissions and significantly reduced signal loss” – notebookcheck.net, September 2022
- “Optical communication is a key area that we think is very, very important for us to reach anything like zettascale type of computing capability.” “AMD is working with DARPA on packaging optics solutions into chips” – Dr. Lisa Su, CEO, AMD March 2023 (HPCwire)
- “Interoperability of AMD Versal adaptive SoCs with the co-packaged Odin® 800G direct-drive optical engine and third party 800G DR8+ retimed pluggable modules” announced – RANOVUS, March 2023
- “Performance metrics in applications like machine learning could ultimately pave the way for high-density integration and optical I/O to connect GPUs.” – Vivek Raghuraman, Director of R&D, Broadcom, March 2023
- “In-package optical I/O technology to accelerate data movement and enable future AI” – Yole Group, April 2023



# 2023 Drivers and Applications Paradigm Shift



Source: Co-packaged Optics for Datacenter 2023, Yole Intelligence, March 2023

# Aehr's New Fully Automated WaferPak Aligner

- Available in stand-alone as well as fully integrated with FOX-XP System configurations
- Provides customers fully hands-free operation up to lights out SECS/GEM factory automation and integration
- Expands Aehr markets & opportunities
- Both stand-alone and integrated configurations have now shipped to customers with revenue recognition expected in FQ1'24 (Aug 23)



FOX-XP with Integrated WaferPak Aligner  
(Shown with 150mm/200mm Wafer Cassettes)

The logo for AEHR Test Systems features the letters 'AEHR' in a large, bold, black font with a white outline. Below 'AEHR' are the words 'TEST SYSTEMS' in a smaller, bold, black font. To the right of the text are five horizontal orange bars of varying lengths, stacked vertically.

# AEHR TEST SYSTEMS

Setting the Test Standard for  
Tomorrow

*Nasdaq: AEHR*