
AEHR
TEST SYSTEMS
Setting the Test Standard for Tomorrow
October 2022
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 timing of COVID-19 related business impacts, 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 2023. 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.

AEHR TEST SYSTEMS

Aehr Test Systems Company Overview

Production Semiconductor Test & Burn-in for over 40 Years!

- Technology leader in massively parallel test and burn-in systems
- World-wide leader in wafer-level burn-in and test systems
- Unique full-wafer test and burn-in systems and contactors

AEHR TEST SYSTEMS

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**

AEHR TEST SYSTEMS

Worldwide Customer Base

Aehr has been a leader in burn-in test solutions for over 40 years with thousands of systems shipped worldwide

AEHR TEST SYSTEMS

(Partial Customer List)

AEHR TEST SYSTEMS

Market Drivers

Need for cost-efficient wafer level and singulated die burn-in & testing as well as new requirements in package part burn-in are creating significant revenue opportunities in the following key markets

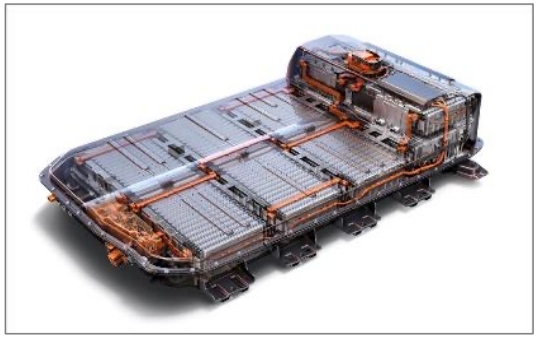
- **Automotive IC growth** in motor control and charging infrastructure using **Silicon Carbide devices**, as well as sensors, safety, information, and entertainment
- **Data Center Infrastructure** and unstoppable growth in **Data Storage**
- **Worldwide 5G Infrastructure** build out using **Silicon Photonics** fiber optic transceivers
- **3D and 2D Sensors** including facial recognition in smartphones, tablets, and other applications
- **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

AEHR TEST SYSTEMS

Automotive & EV Semiconductor Device Market

- Automotive IC growth in sensors, control, information, and entertainment has substantially higher requirements for initial quality and long-term reliability
- New high bandgap / high voltage semiconductors (Silicon Carbide and Gallium Nitride) create new opportunities in test and burn-in

Collision Detection

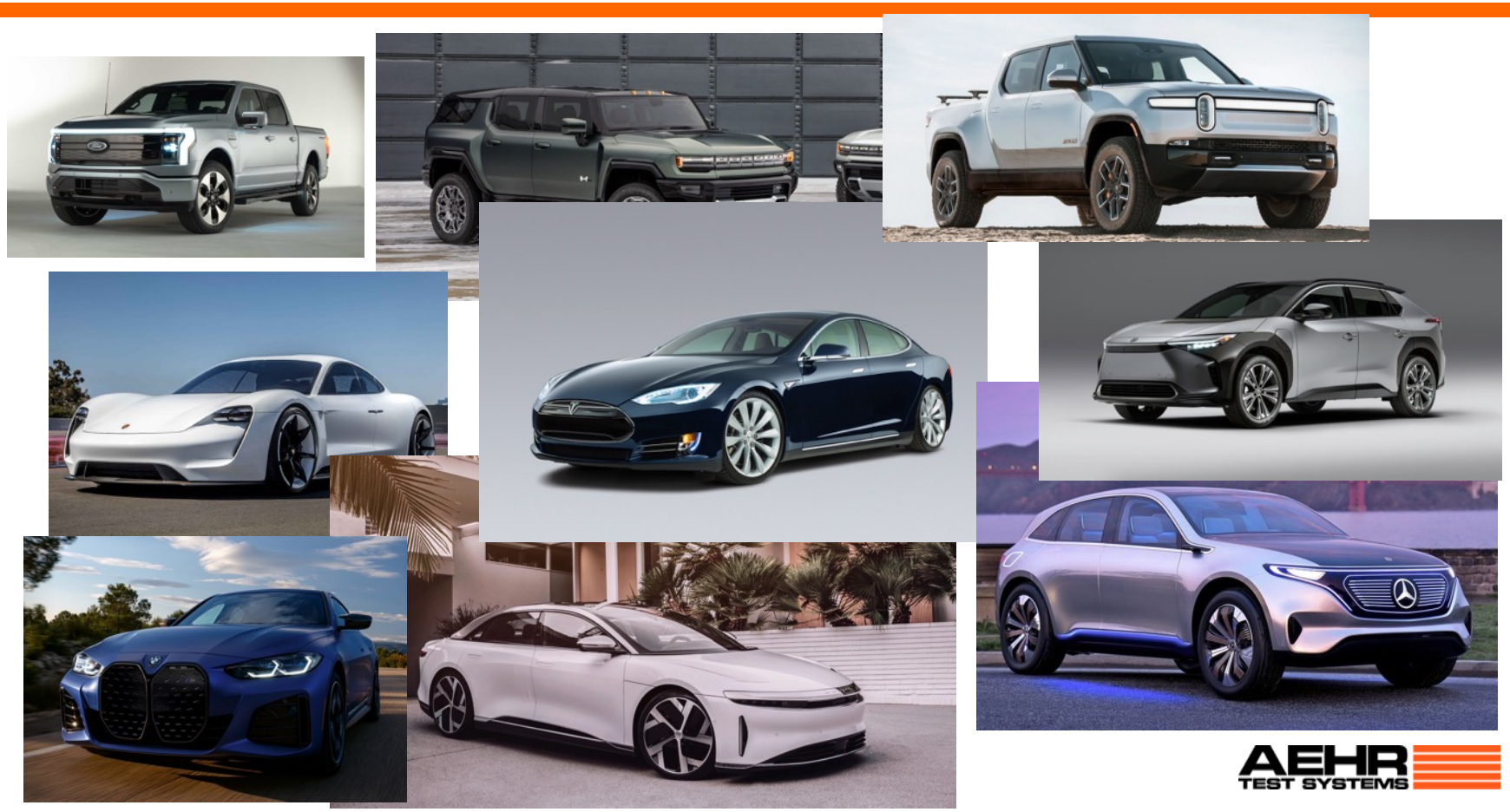


EV Power Management

Autonomous / Driver Assistance

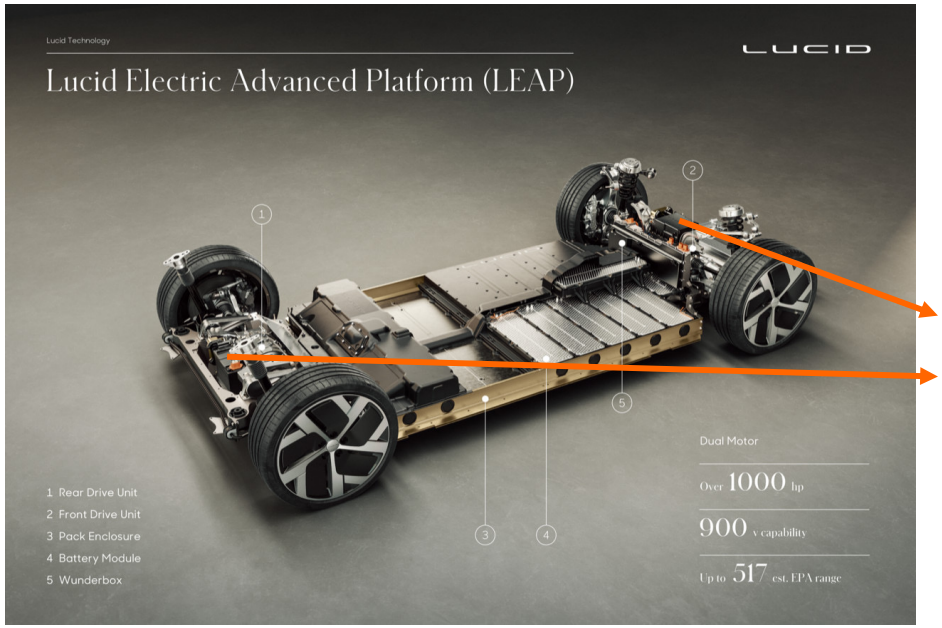
AEHR TEST SYSTEMS

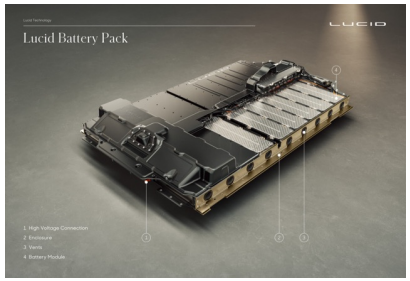
A New Electric Vehicle World

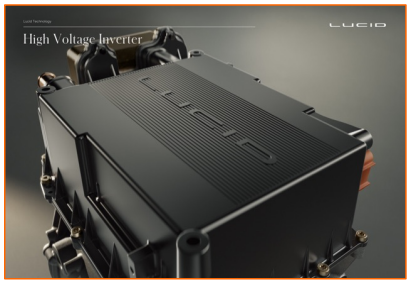


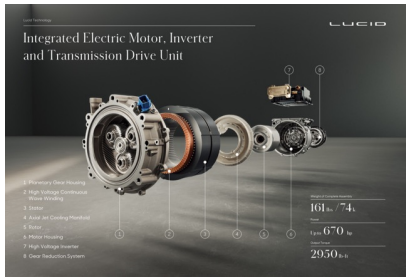
AEHR TEST SYSTEMS

Power Inverter in Electric Vehicle Drive Motors









900V DC
Battery Pack

1200V DC to AC
Silicon Carbide Power Inverters

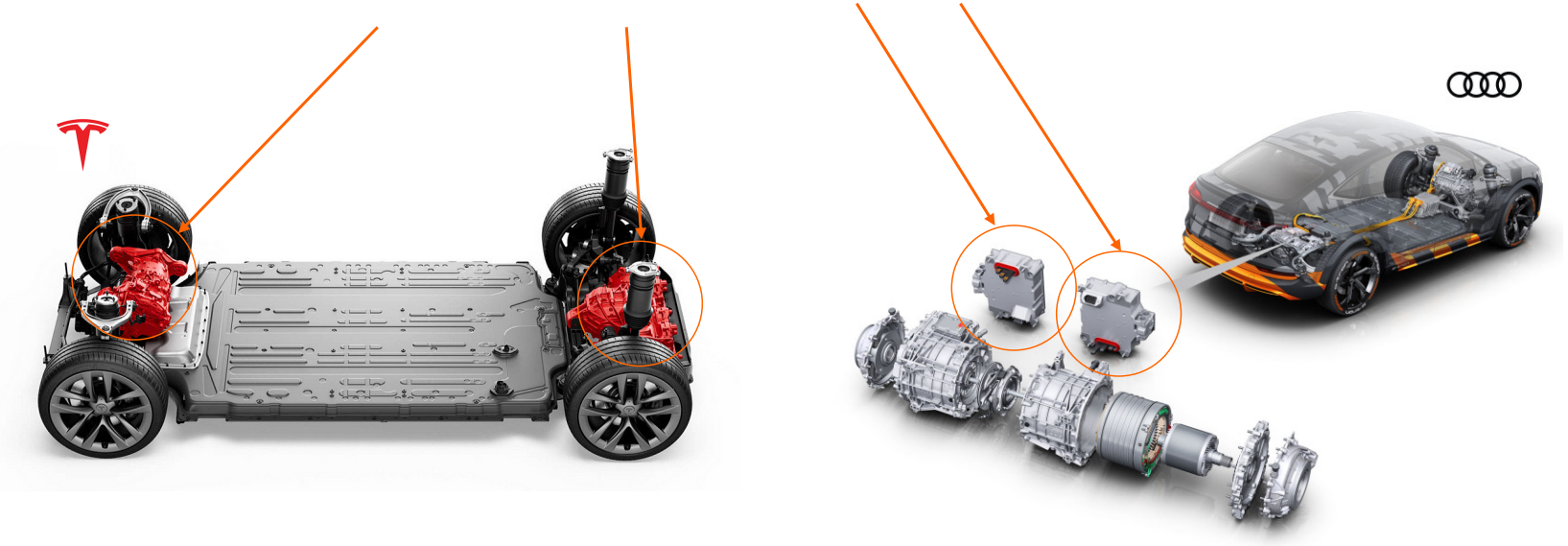
AC Induction Motors

Source: Lucid Motors

AEHR TEST SYSTEMS

EV Drive Train DC to AC Power Inverters

"Traction" Inverters per Motor



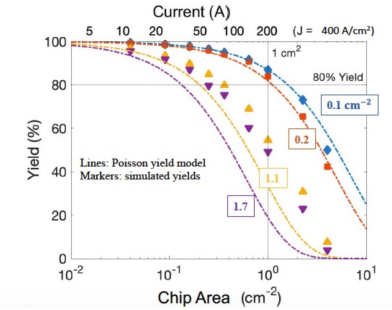
Sources: Tesla, Audi

AEHR TEST SYSTEMS

Silicon Carbide Modules in EVs

- A 100kW 3-phase inverter for use in future Electric Vehicle (EV's) chargers needs a 450A to 550A rated switch for a 400V rated battery
- The largest SiC dies available at a 650V voltage rating are listed below

Vendor	Rated Continuous ID at 25C (A)	Rdson Typ 25C (mOhms)	Part Number
Infineon	64	22	IMBG65R022M1H
ST Microelectronics	119	18	SCTWA90N65G2V-4
Wolfspeed	120	15	C3M0015065D



- Several devices needed in parallel for the 3-phase power module application.

Automotive Qualified 1200V Silicon Carbide XM3 Half-Bridge Power Module from Wolfspeed.

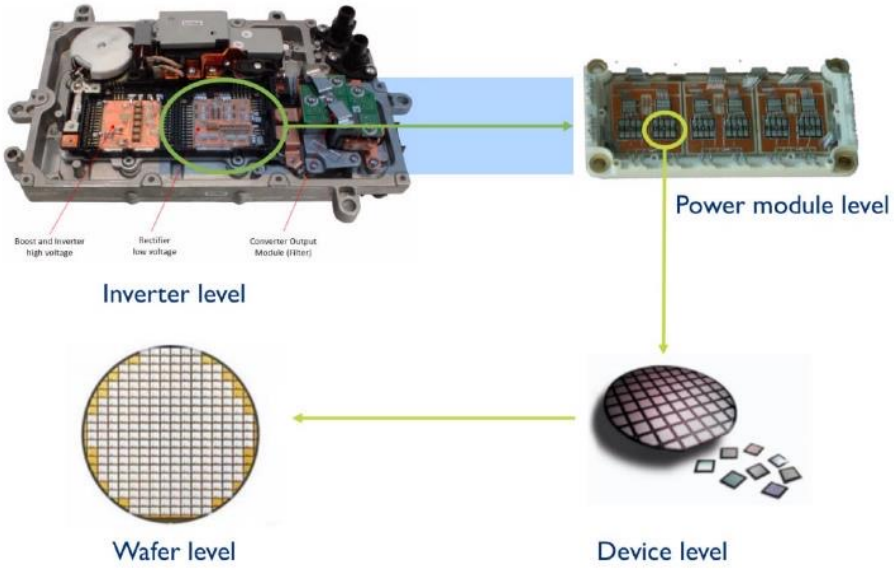
Ref: The SiC MOSFET Reliability Studies at the Ohio State University: Threshold Voltage Stability and Gate Oxide Screening Challenges
September 8, 2022 Sonu Daryanani

https://www.powerelectronicsnews.com/the-sic-mosfet-reliability-studies-at-the-ohio-state-university-threshold-voltage-stability-and-gate-oxide-screening-challenges/

AEHR TEST SYSTEMS

Burn-in at Module is Very Expensive on Yield

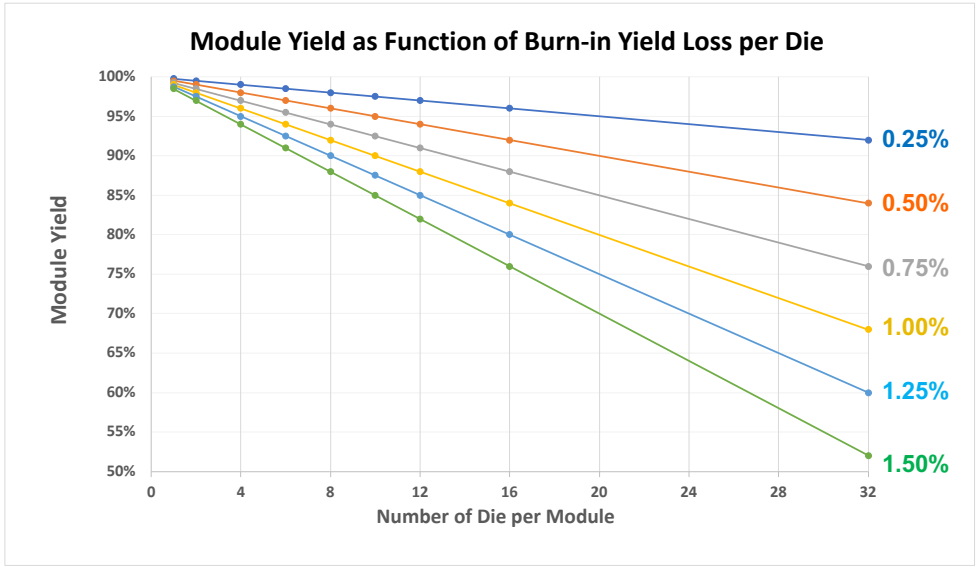
Silicon Carbide Module with 10 Die



Customers driving to move Silicon Carbide burn-in to Wafer Level

AEHR TEST SYSTEMS

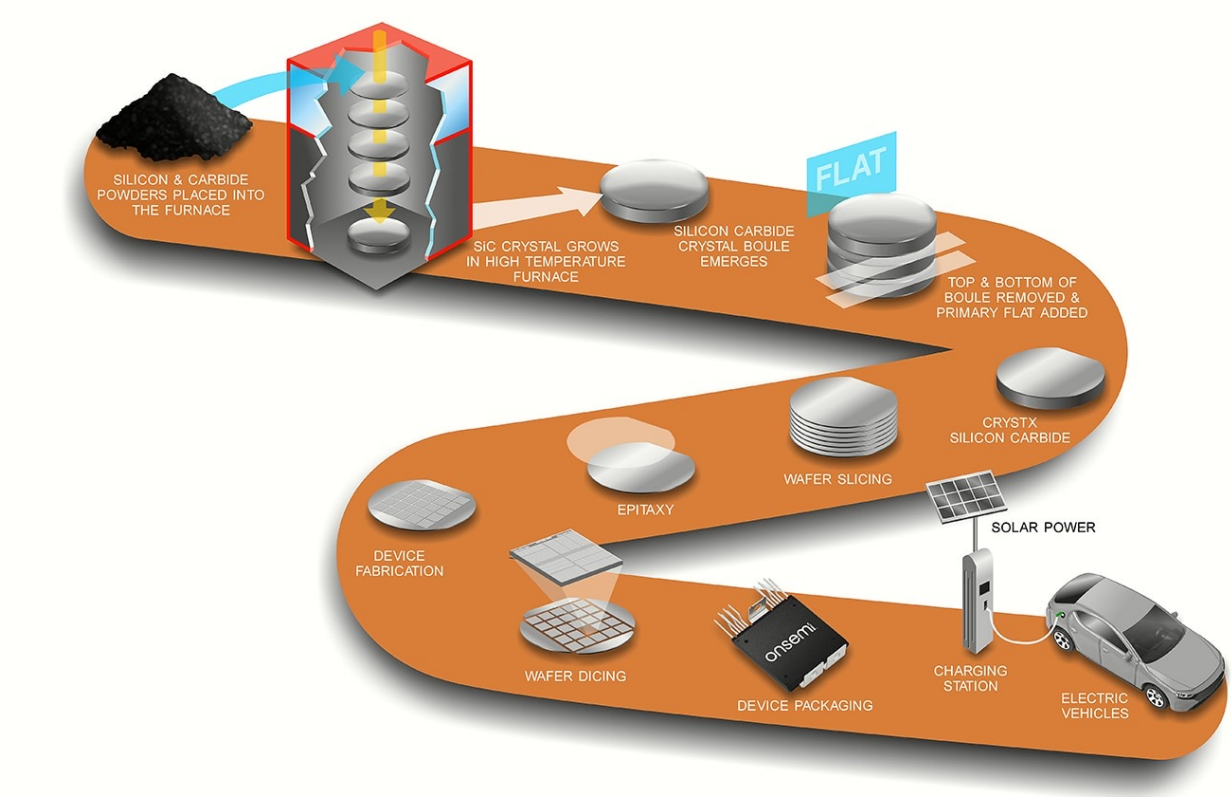
SiC and Multi-Die Packages / Modules



- Infant Mortality Yield loss of Modules linear with yield loss per die times number of die per module
- Cost of yield loss much greater than cost of burn-in test
- This is why the industry is driving to Wafer Level Burn-in

AEHR TEST SYSTEMS

Silicon Carbide Device Process Flow

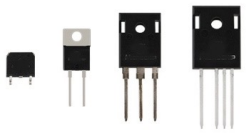


Source: onsemi

AEHR TEST SYSTEMS

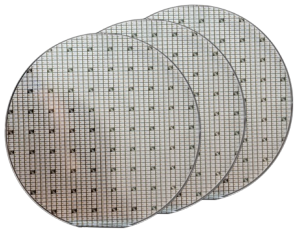
Package Part vs Wafer Level Burn in

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

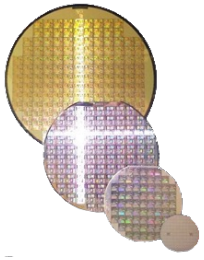


x18

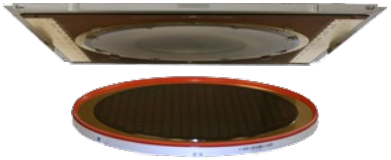
- Up to ~ 45,000 SiC devices per system
- 1000s of devices handled at a time with micro-pogo contact to die >> 100,000 cycle life
- Conduction Thermal Control (Thermal Chuck)
- Equipment depreciation cost of ~ $0.01 per hour burn-in cost (typical 500 die per wafer inverter MOSFET) and ~ $0.002 per (2500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

AEHR TEST SYSTEMS

Integrated Wafer Level Test & Burn-in Solution



Wafer

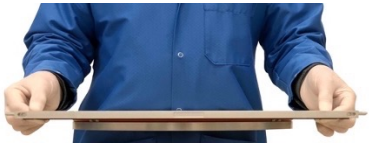


WaferPak Contactor

Consumable input into the test system driving recurring revenue from the installed base

FOX-*Auto Aligner*

Performs wafer alignment “offline” which eliminates the need for one wafer prober per wafer during long burn-in and test times



WaferPak

FOX-*XP* WaferPak Insertion

Footprint similar to single wafer automated prober and test equipment – reducing floor space up to 94%

AEHR TEST SYSTEMS

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 . . .

AEHR TEST SYSTEMS

Silicon Carbide Market Opportunity for AEHR

- Aehr qualified at several automotive suppliers through initial lead customer for Wafer Level test and burn in of modules and discrete SiC devices
- Wafer level test and burn-in will become the industry standard for Silicon Carbide devices aimed at electric vehicles
- Aehr has the most cost-effective solution on the market today and expects to gain significant market share
- Electric vehicles will grow to over 30 million units by 2030 (over 30% of total market)
- Silicon carbide capacity will explode to try to catch up with demand growing by 25x from 150,000 wafers in 2021 to over 4,000,000 wafers in 2030 just for Electric Vehicles
- Aehr announced two additional customers for Silicon Carbide in last month, is in discussions with and/or engaged with all of the large silicon carbide players today, and is working with most silicon carbide suppliers worldwide (including several that have yet to introduce their silicon carbide devices aimed at EV traction inverters)
- Aehr forecasts that at least several additional companies will purchase and begin deliveries of systems for production by the end of our fiscal year (ending May 31, 2023)

Source for EV units: Deloite
Source for Wafer starts: Canaccord Genuity

AEHR TEST SYSTEMS

Key Takeaways

- Pioneer of next generation technology platform for wafer level testing
- Significant need for lower cost wafer level test / burn-in
- Wafer level and singulated die test / burn-in being adopted by across multiple high-growth markets including Silicon Photonics and Silicon Carbide
- Aehr has a significant architectural and intellectual property advantage over alternative solutions in both cost of test, footprint, and capacity.
- Over a dozen new customer engagements for wafer level test / burn-in including multiple large silicon carbide suppliers
- Growing, high margin consumables revenue

AEHR TEST SYSTEMS


AEHR
TEST SYSTEMS
Setting the Test Standard for Tomorrow
Nasdaq: AEHR