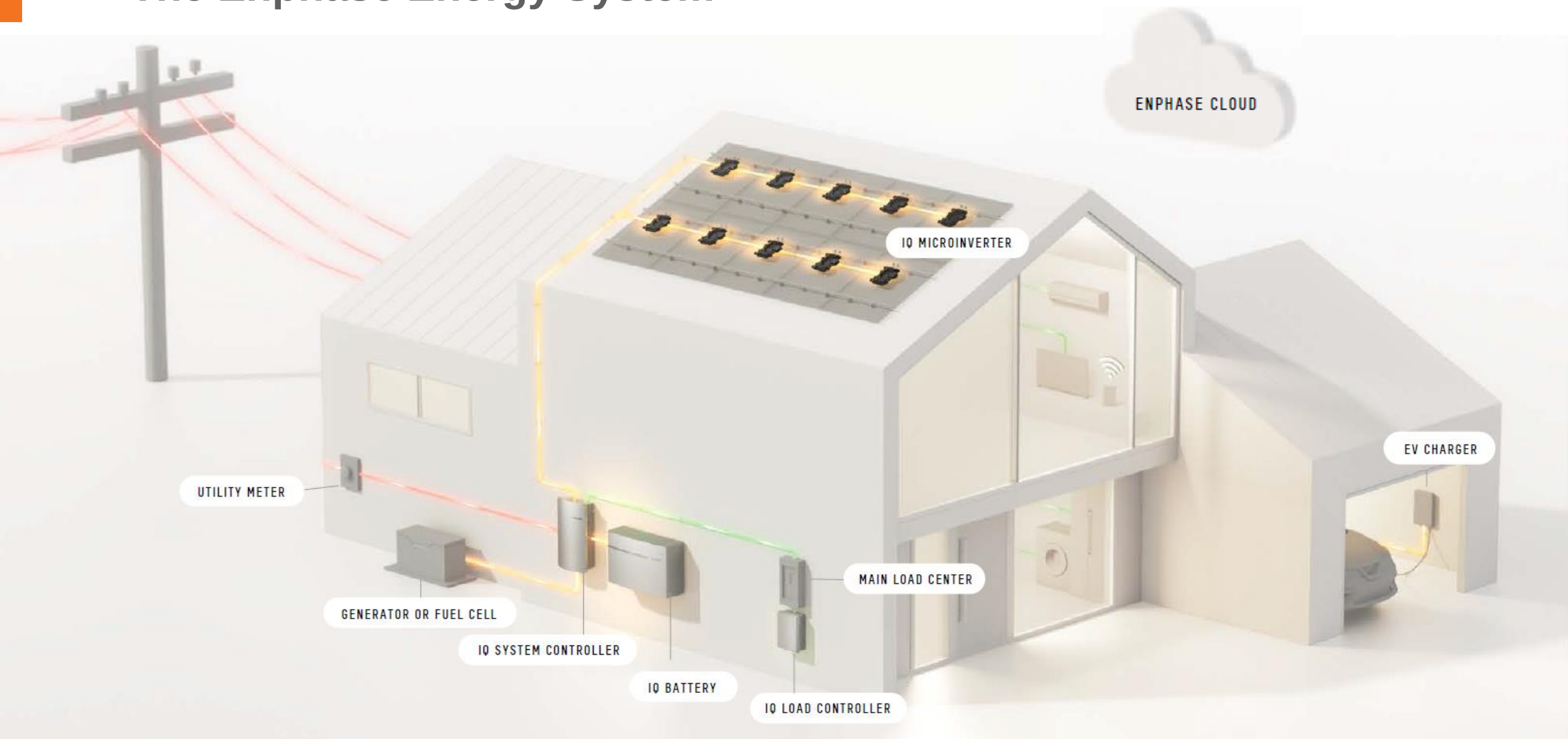


Advances in PCS Technology and Products

Blake Lundstrom, Ph.D., P.E.

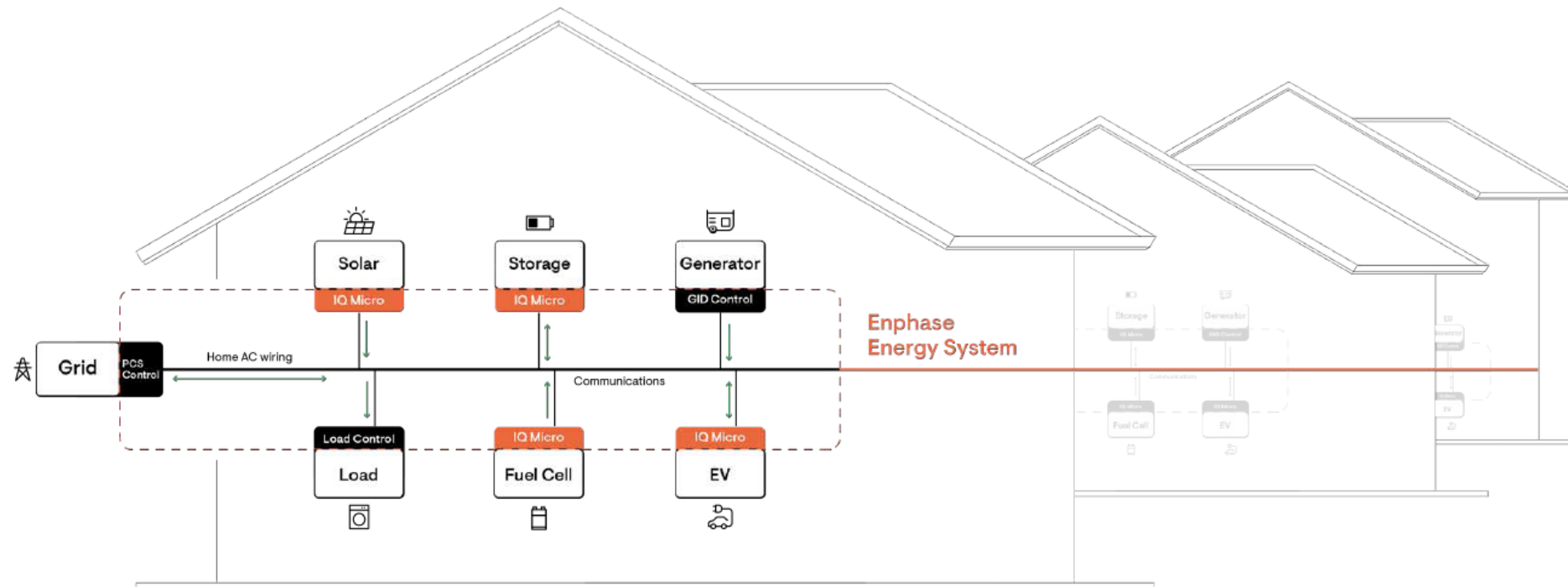
Energy Storage Systems Safety & Reliability Forum
May 5, 2022

The Enphase Energy System



The Enphase Energy System

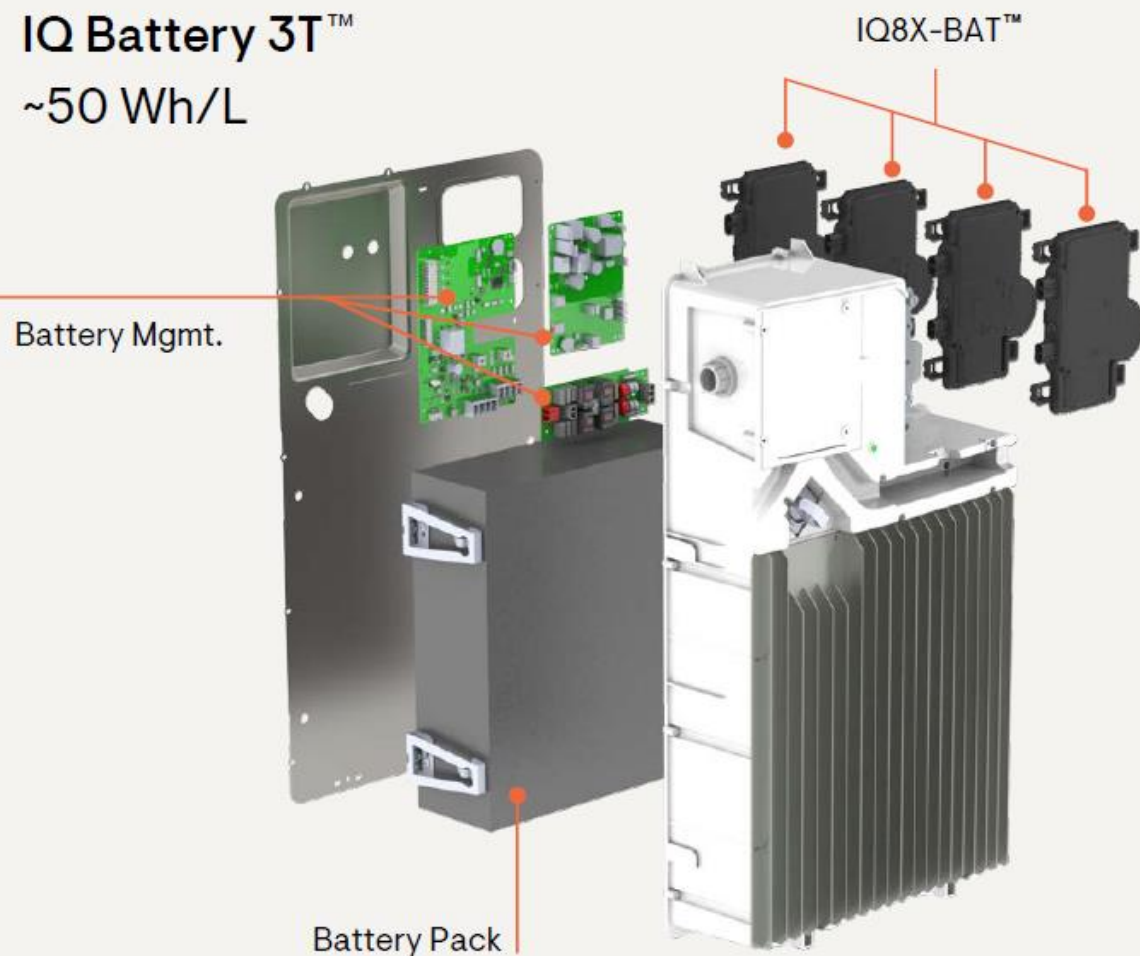
- Distributed AC architecture – simple, universal, reliable
- Architecture is extensible beyond a single home
- Hierarchical control (primary, secondary, tertiary) enables coordination of nested areas
- Transactive energy



Next Generation IQ Battery

IQ Battery 3T™

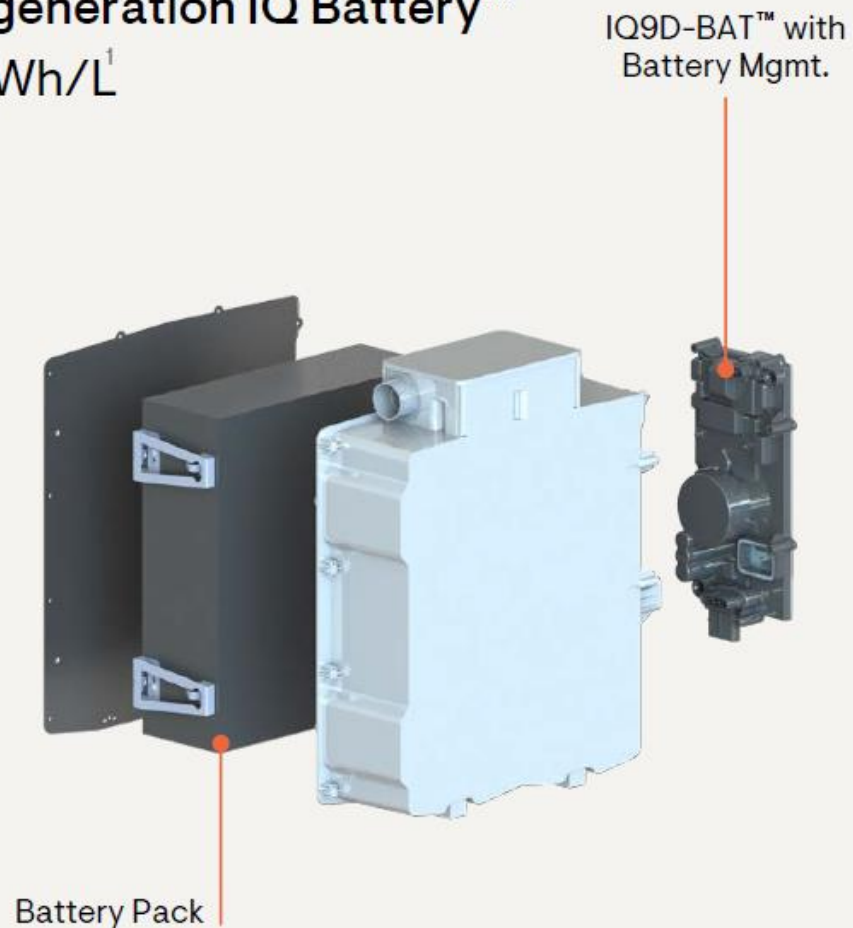
~50 Wh/L



3.84 kW / 5 kWh

Next generation IQ Battery™

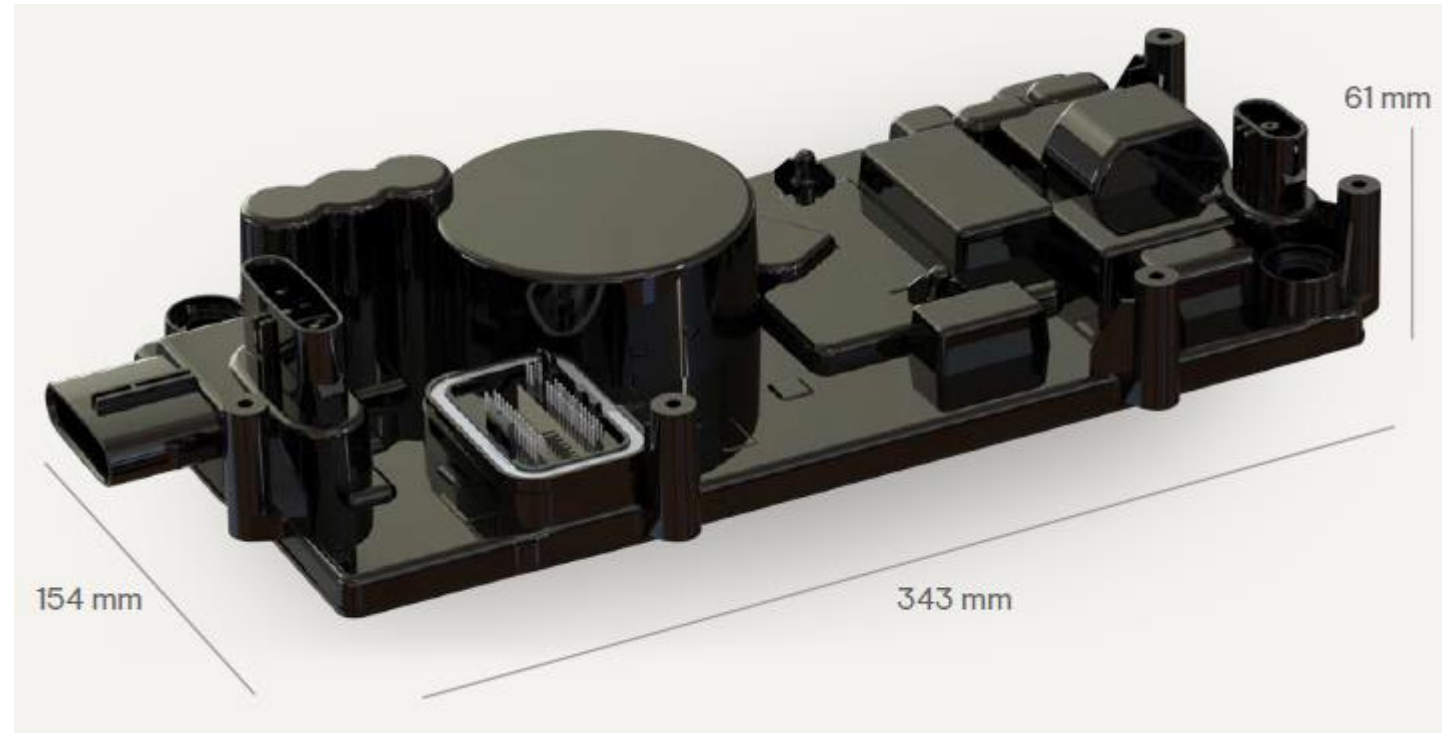
~100 Wh/L¹



- LFP battery chemistry
- First UL9540A-certified residential energy storage system

Next Generation IQ9-BAT PCS

- Enabler for the next generation IQ Battery
- Combined battery management and power conversion
- Single board replaces seven from before
- Single firmware image
- Large focus on Reliability Demonstration Testing (RDT) and Long-Term Reliability (LTR) testing for our products and their components

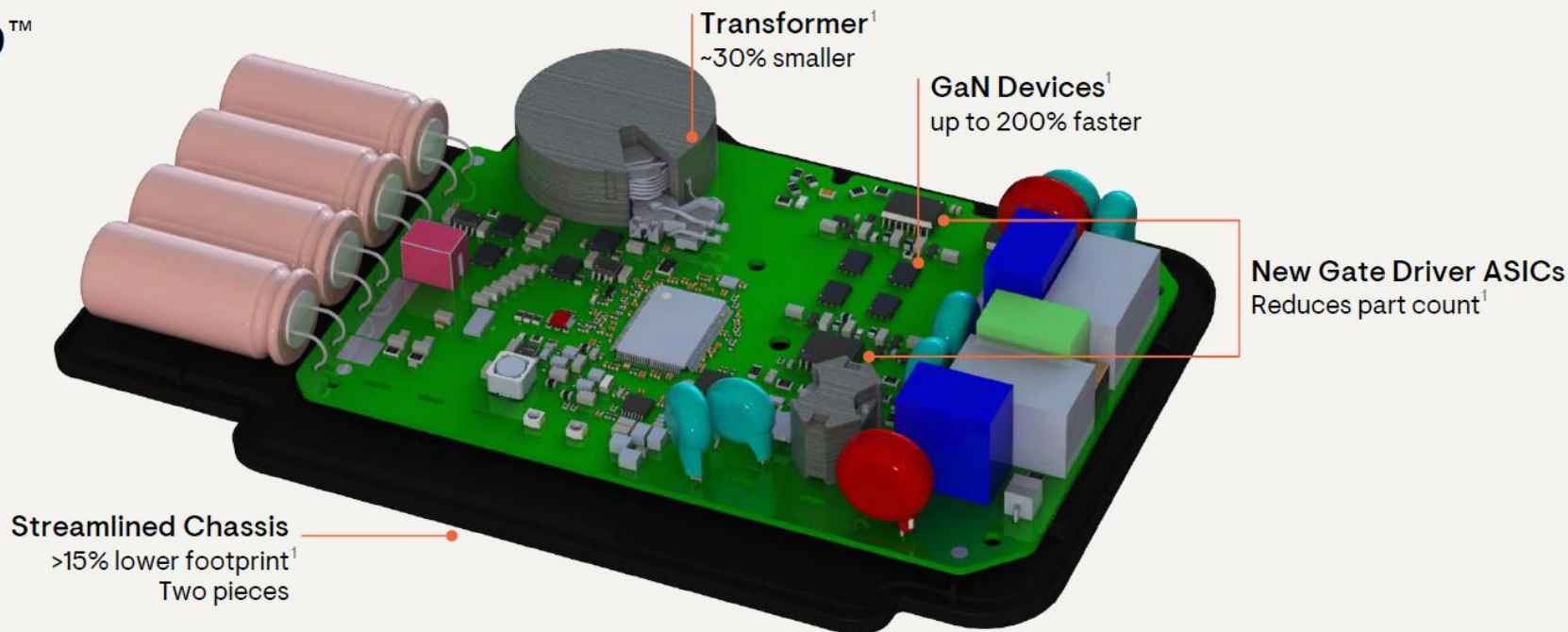


Currently planned rating: 1.92 kVA

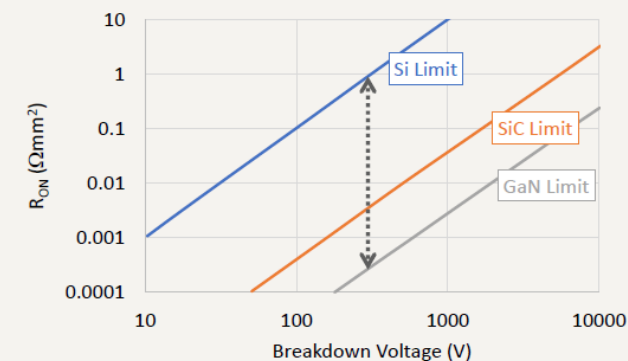
Next Generation IQ9 PCS

- 50% more power density compared to IQ8
- GaN allows for higher power and faster switching of AC FETs with >1000x less resistance than silicon for given voltage
- 2x switching frequency reduces transformer size by 30%
- New gate driver ASIC reduces part count
- New features: variable frequency and 3-ph microgrid forming

IQ9™



Performance of GaN and SiC versus Silicon devices



Gallium Nitride (GaN) is a wide-bandgap device (3.2 eV) helps in making power electronics smaller, faster and energy efficient

