



*“The Silicon Chip is Dead!”*



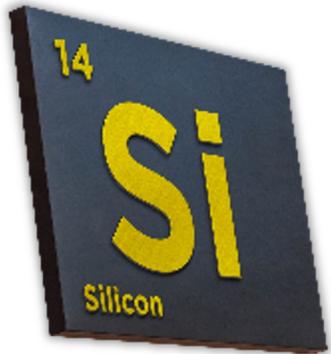
**Stephen Oliver**  
*VP Corporate Marketing  
& Investor Relations*



# Navitas

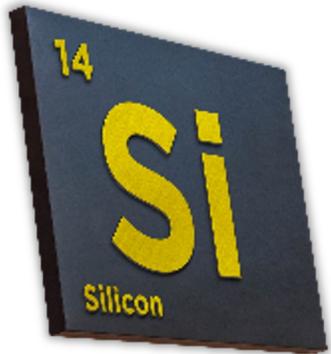
*Energy • Efficiency • Sustainability*





Process...	In	At
Data (101010101)	CPUs, GPUs, memory	Low voltage (~1 V)





Process...	In	At
Data (101010101)	CPUs, GPUs, memory	Low voltage (~1 V)
Power (Volts, Amps)	Converters, chargers, inverters, motors	High voltage (650 V+)

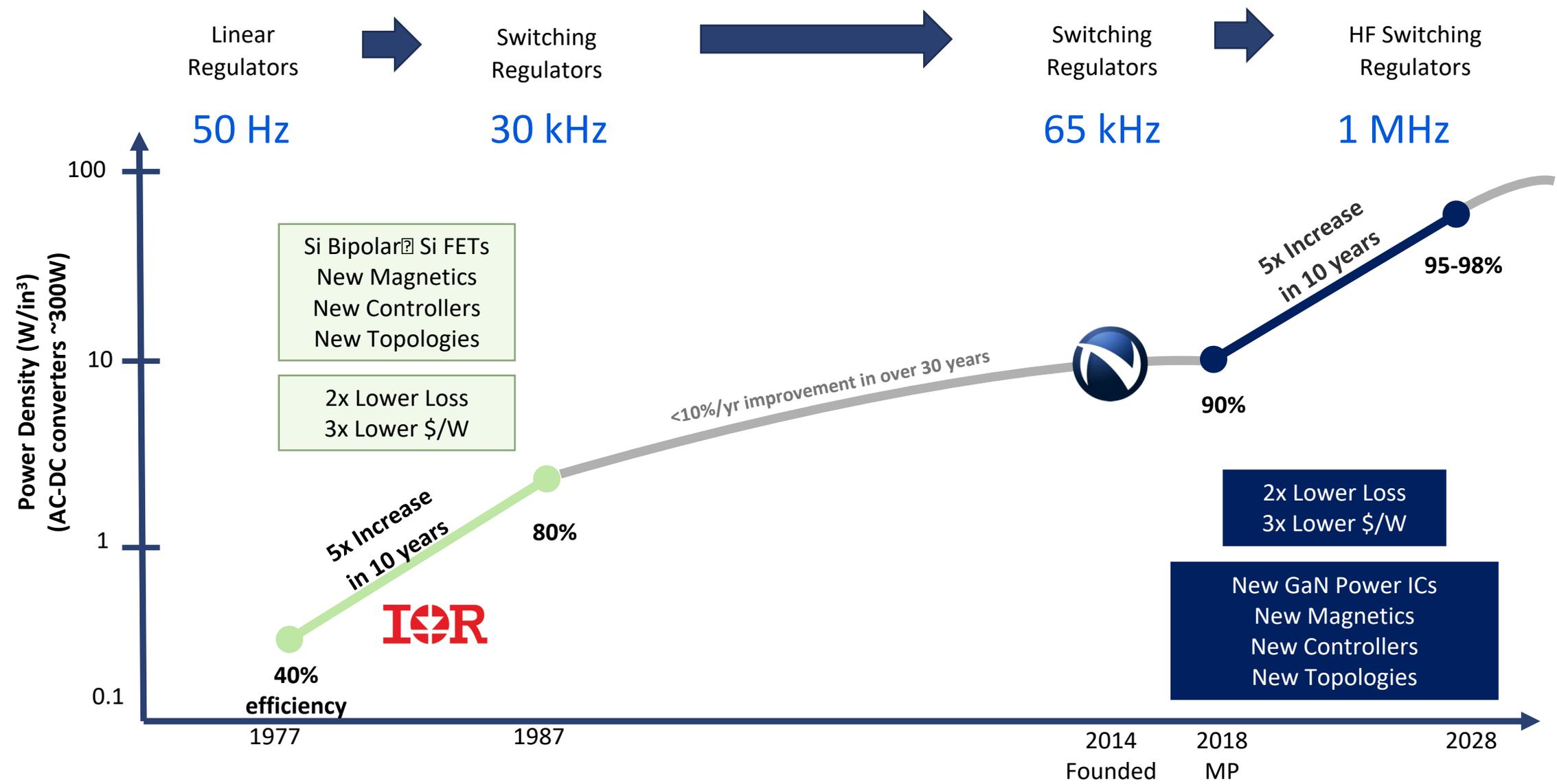


# The Next-Generation of Power Semis



Note: Navitas estimate of GaN- & SiC-based power systems compared to silicon in the 2024-2025 timeframe.

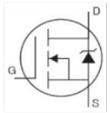
# The Second Revolution in Power (*GaN example*)



# The GaN Revolution: Ultimate Integration

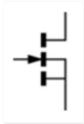


Silicon FET



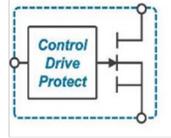
- Old, slow
- High  $Q_g$
- High  $C_{oss}$
- $F_{sw} < 100$  kHz

Discrete GaN



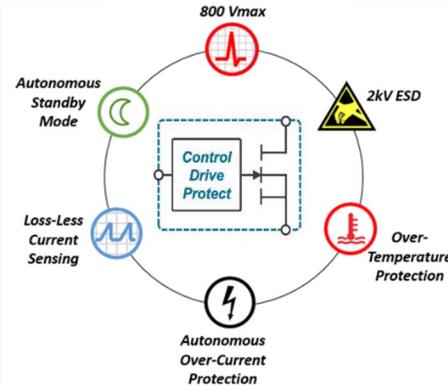
- Exposed gate
- External gate drive
- $dV/dt$  sensitivity
- Layout sensitivity
- ESD sensitivity
- Unknown reliability
- Unknown robustness

**GaNFast™**  
200-300 kHz



- Internal Gate
- Integrated Gate Drive
- $dV/dt$  Immunity
- Layout Insensitive
- 2 kV ESD rating
- Proven Reliability
- Proven Robustness

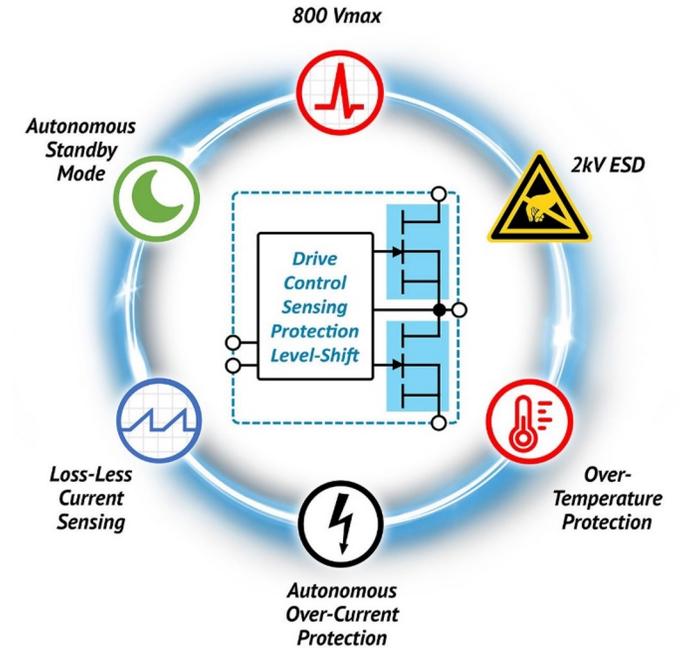
**GaNSense™**  
500 kHz



**GaNFast plus:**

- Autonomous Standby
- Autonomous Protection
- Loss-less Current Sensing
- High Precision
- High Efficiency

**GaNSense Half-Bridge**  
1 MHz



**GaNSense plus:**

- Highest integration
  - integrated HS and LS FETs
  - Integrated level-shift isolation
  - integrated boot-strap
  - Shoot-through protection
  - Enlarged cooling pads
- Fastest switching
- Highest efficiency



### Fast Switching

Highest efficiency hard-switch, soft-switch  
(Lowest  $E_{ON}$ ,  $E_{OFF}$ ,  $E_{ZVS}$  losses)

### Cool Operation

Lowest  $R_{DS(ON)}$  at high temperature  
(25% lower than industry typical)

### 100%-Tested Robust Avalanche

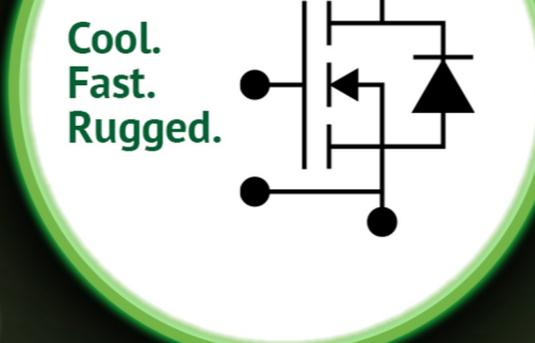
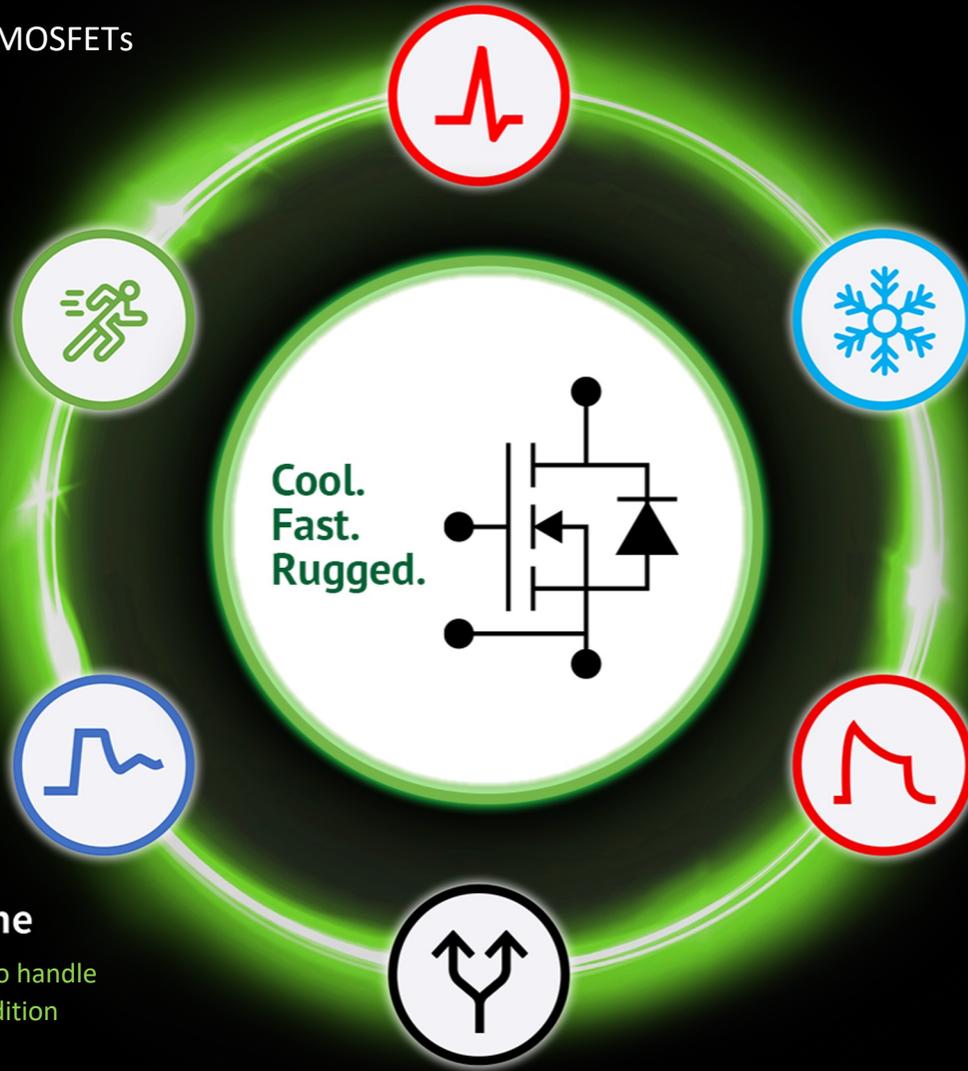
Highest published capability to handle excess energy in fault condition

### Long Short-Circuit Withstand Time

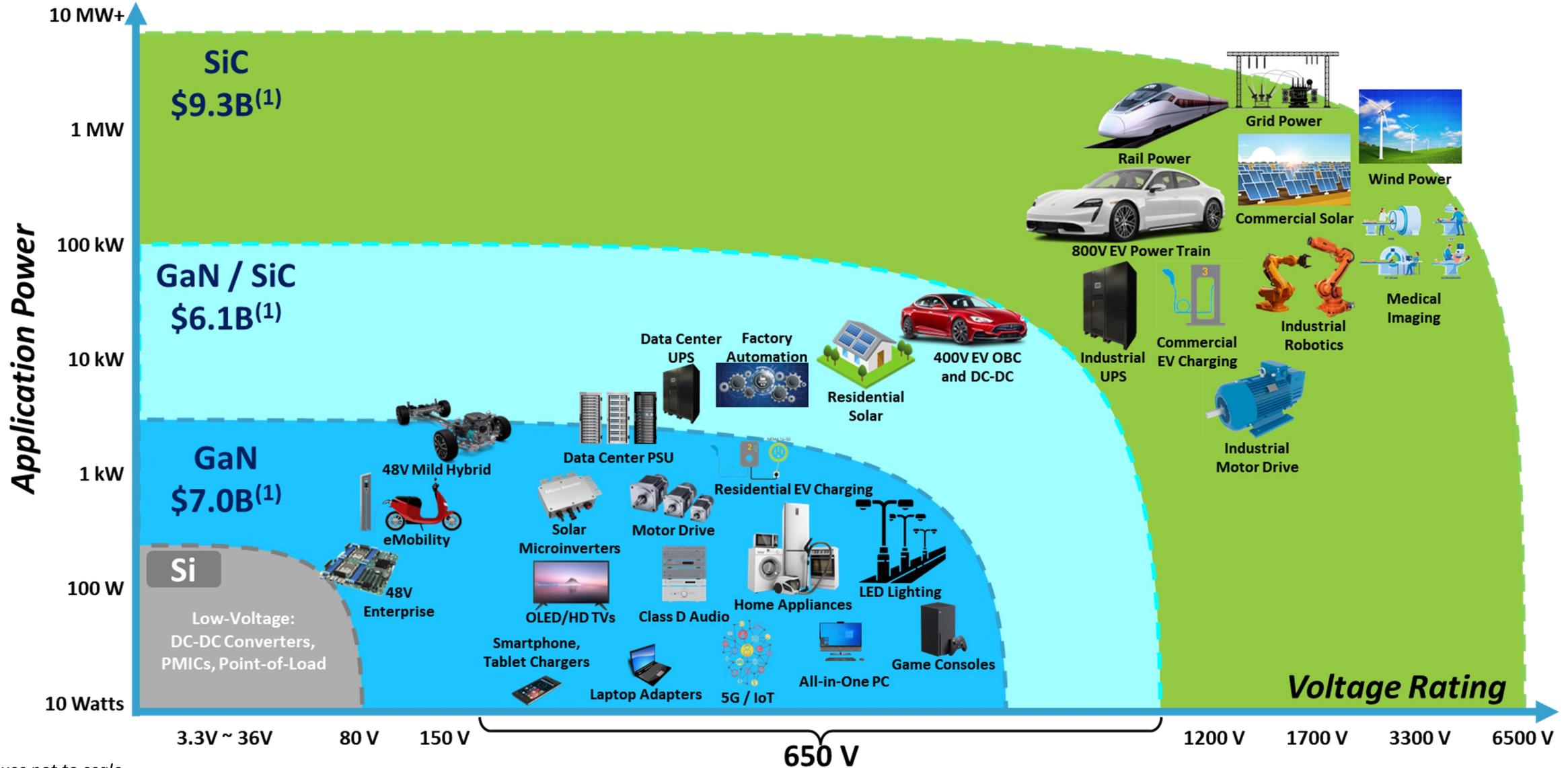
World-class survival duration in fault condition

### High-Power Paralleling

Matching currents  
(Stable  $V_{TH}$ )



# A \$22B 'Pure-Play' Market Opportunity

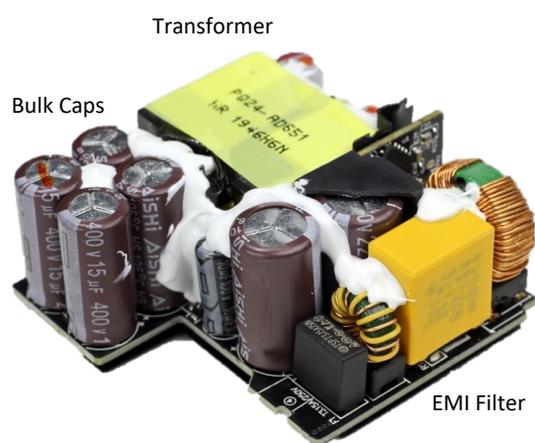


Axes not to scale

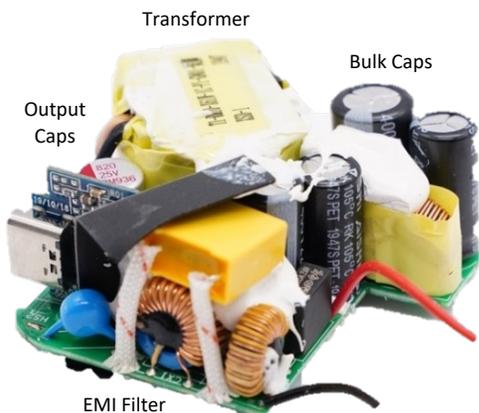
1) 2026E potential, Source: Yole, DNV, IRENA, Fraunhofer ISE, IHS, Cisco, Hyperscale, Peer annual reports, Wall Street research.

# High Speed Shrinks Passive Components

Typically, slow-speed designs have ~70% of volume used by transformer, capacitors, EMI filter, etc.

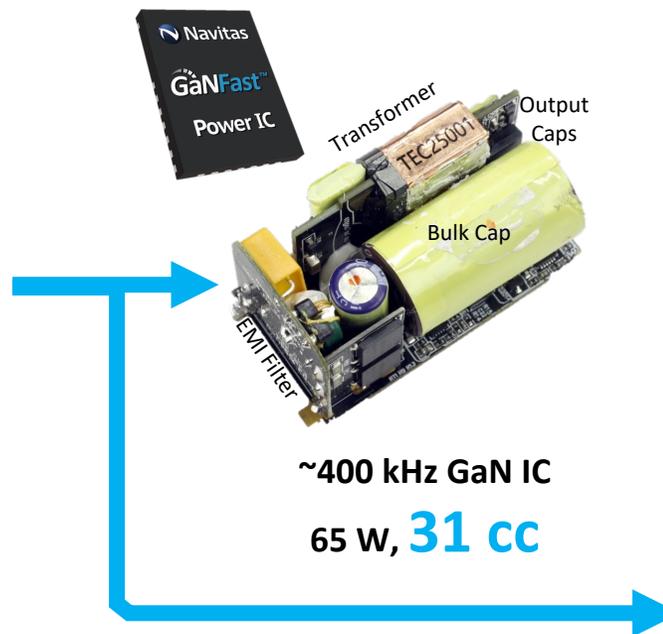


~65 kHz Silicon  
65 W 43 cc



~75 kHz GaN Discrete / MCM  
65 W, 46 cc

High-speed GaN IC designs **shrink** 'passive' components by ~50%<sup>(1)</sup>



~400 kHz GaN IC  
65 W, **31 cc**



~750 kHz peak Half-Bridge GaN IC  
**120 W, 44 cc**

**~2x faster charging!**



Half-Bridge IC delivers ~2x the power, or ~2x faster charging in the **same size**<sup>(1)</sup>

# 120 W: 70% Smaller, 65% Lighter, 35% Energy Savings

**Silicon  
120W  
19V**



**Asus 120W (PA-1121-28)**

**84.6%\* peak**

**159 x 76.9 x 27.15mm = 332 cc, 419 g**

**0.36 W/cc**



**GaN  
120W  
USB-C**



**Xiaomi Note 11 Pro**

**90.5%\* peak**

**55.5 x 55.5 x 28.4 mm = 87.5 cc, 147 g**

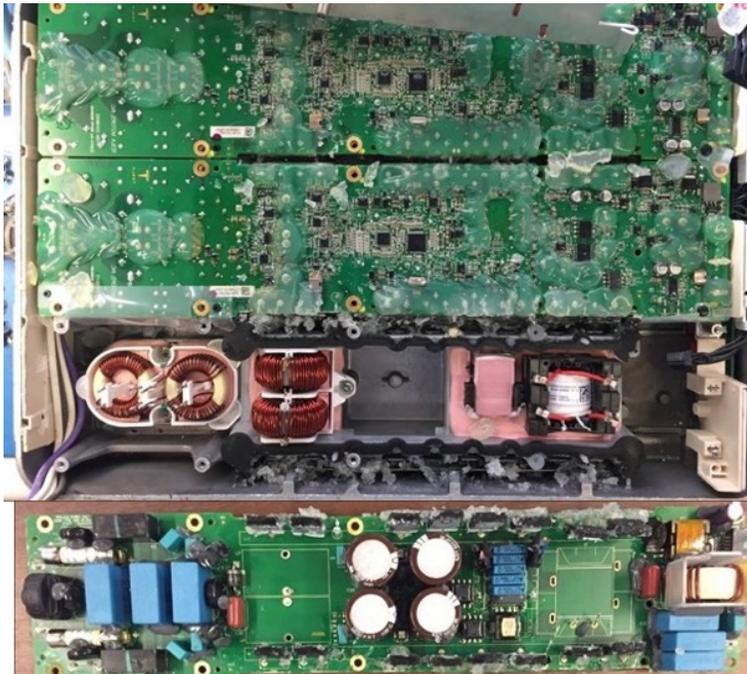
**1.37 W/cc**



1) As of June 30<sup>th</sup>, 2022.

2) Based on Navitas shipment data and no customer-reported consumer failures for production shipments through May 2021.

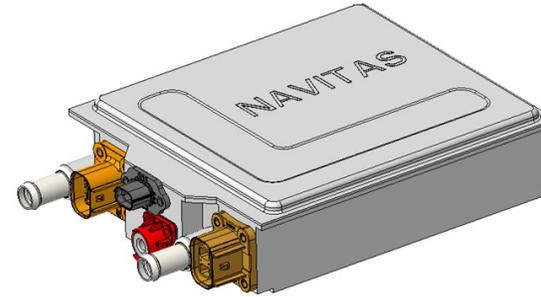
# EV On-Board Charger: >10x Smaller, 60% Energy Savings



**Silicon 6.6kW  
Uni-directional OBC  
(Tesla Model S)**

**92%**

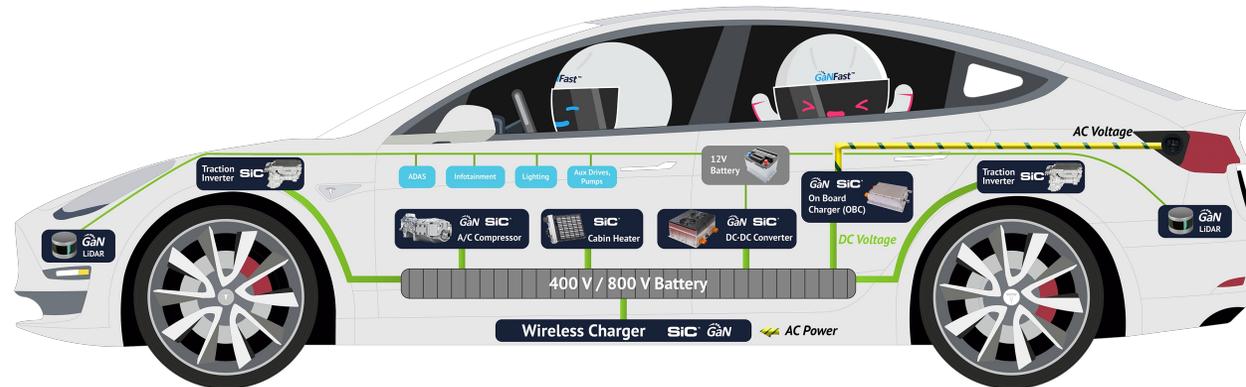
**530 x 380 x 155 mm  
31,217 cc = 0.2 kW/L**



**GaN 6.6 kW  
Bi-directional OBC  
+ 3 kW DC-DC  
(Navitas EV Design Center)**

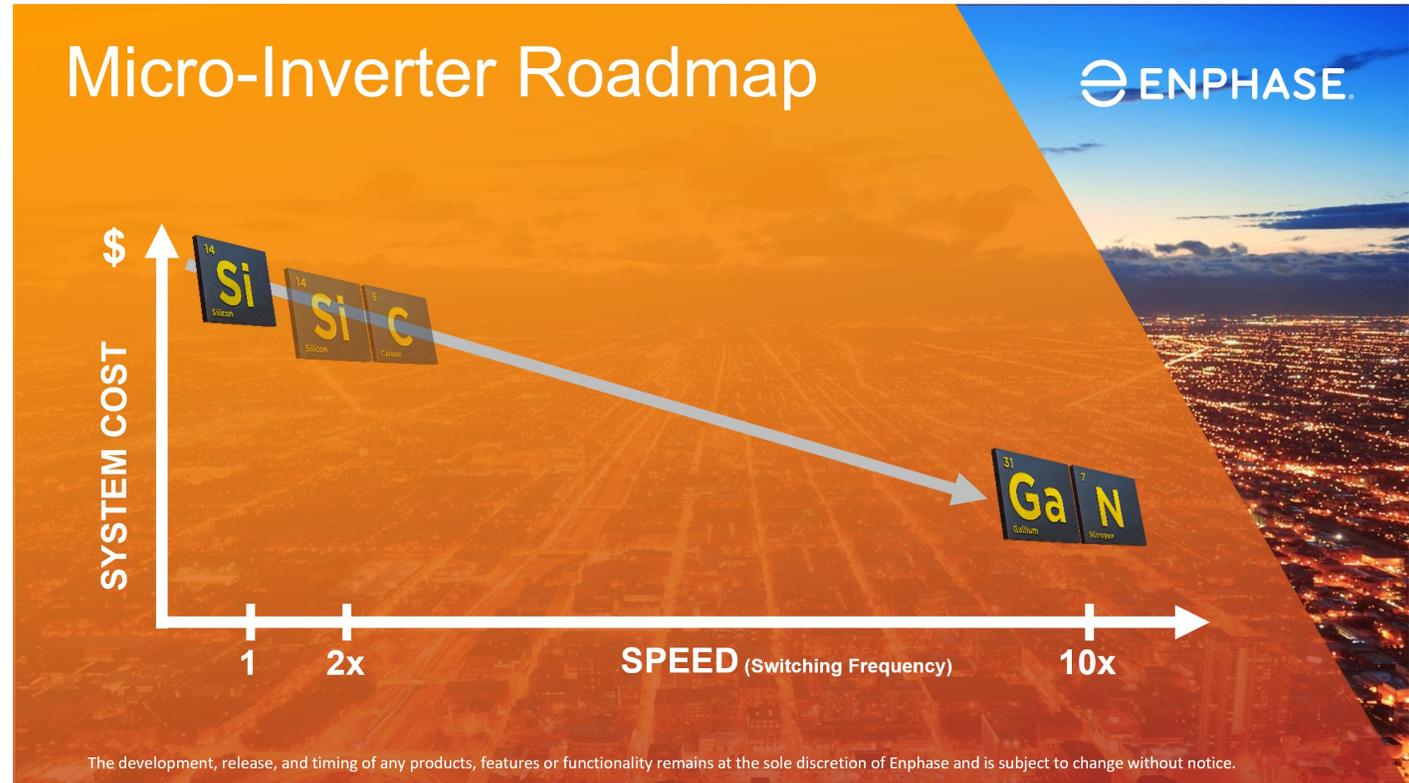
**95%**

**210 x 192 x 61 mm  
2,459 cc = 3.7 kW/L**





- Low-voltage DC to 50-60 Hz, 110 V / 220 V AC
- Power increasing as panel efficacy improves, from 250-300W up to 450-500W
- Silicon to GaN upgrade at higher switching frequencies has significant cost reductions, estimated at 25% per micro-inverter<sup>(1)</sup>



Enphase Energy slide from Navitas New York Investor Meeting 2021

(1) Navitas estimate

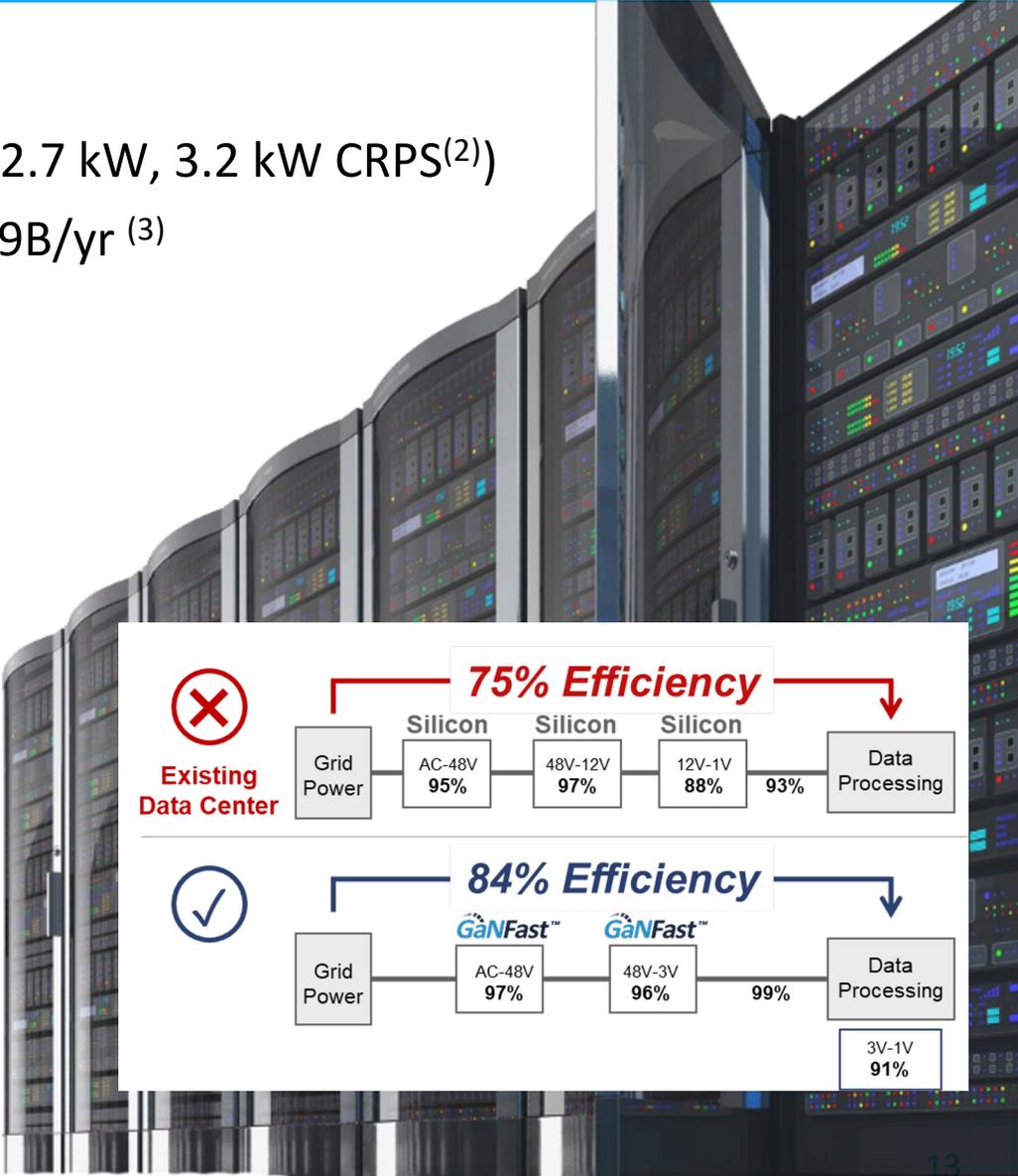
# Data Center Power: >2x Smaller with GaN

- Euro ‘Titanium plus’ standard from January 1<sup>st</sup>, 2023<sup>(1)</sup>
- Design Center: 4 platforms, 8 customer projects (1.3 kW, 1.6 kW, 2.7 kW, 3.2 kW CRPS<sup>(2)</sup>)
- GaN can reduce electricity use by up to 10%, save >15 TWh or \$1.9B/yr <sup>(3)</sup>

Slow Silicon AC-DC 3,200W	GaNFast AC-DC 2,700W
<p>47 kHz 325 x 107 x 41 mm 2.2 W/cc</p>	<p>300-500 kHz 185 x 73.5 x 39 mm 5.1 W/cc</p>
	<ul style="list-style-type: none"> <li>• &gt;2x higher power density</li> <li>• &gt;30% reduction in energy loss</li> </ul>

*“GaN is a breakthrough new technology that is enabling dramatic reductions in size, energy savings and power density”*  
*“Navitas is an excellent partner with industry-leading GaN ICs”*

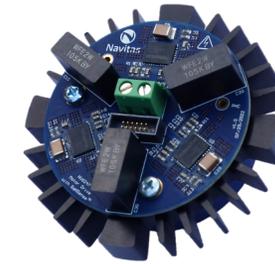
Robin Cheng, VP R&D 肯微科技股份有限公司  
 Compuware Technology Inc.



(1) European Union ‘Directive 2009/125/EC, 2019 Annex’, power supplies must be >96% efficiency peak.  
 (2) CRPS = Common Redundant Power Supply standard, defined by Intel for standardized mechanical form-factors, targets hyper-converged compute, storage and networking eqpt.  
 (3) Navitas est. based on a) Navitas server/datacom forecast & AAAS data, b) \$0.12/kWhr, c) Si vs. GaN \$/W and d) data-center loading profile. Estimated based on known existing Si-based solutions to deliver >500A next-generation data processors to Navitas targets for new GaN-based AC/DC and DC/DC for these same next-generation data processors  
 © Navitas Semiconductor 2023

# 90% Energy Saving vs. AC Motors

Legacy Si-Based Brush-less DC (BLDC)  
Motor & Inverter for Washing Machine  
(~80% efficiency)

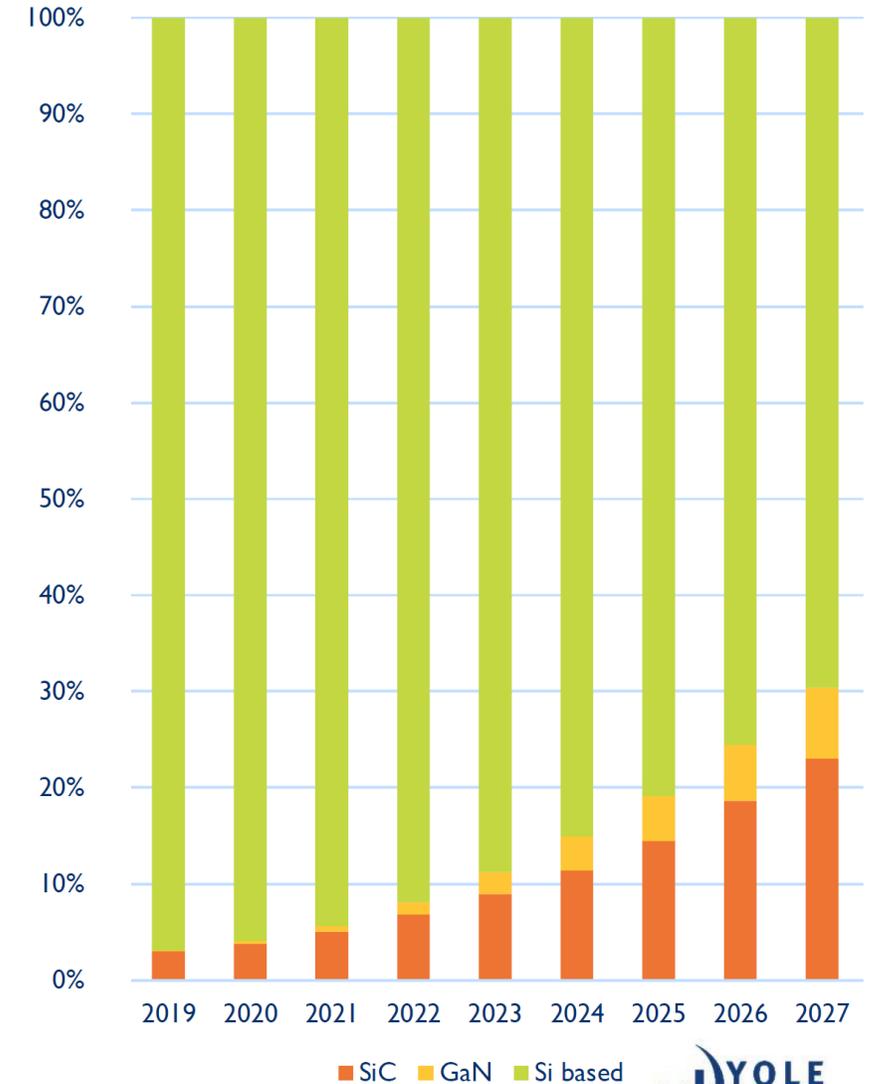


GaN-Based 300W 3-phase Platform  
for Inverter-Motor Integration

- 2x higher frequency
- >60% fewer components, PCB area
- 95-97% efficiency
- 80% energy savings vs Silicon BLDC
- 90% energy savings vs AC motors
- High reliability
- Fast time to market
- 50-300W Motors = \$1.5B/yr GaN Opportunity<sup>(1)</sup>

(1) Navitas estimate 50-300W motors, including circulators, hydronic pumps, aircon IDU/ODU fans, HVAC, air purifiers, hair dryers, refrigerator compressors, dishwashers, washing machines.

# GaN & SiC: 30% of the Market by 2027



# Leader in Sustainability



February '22 First GaN sustainability report based on global standards.

Every **GaNFast™ IC** saves<sup>(3)</sup>

**4 kg CO<sub>2</sub>**



**4x-10x** lower component CO<sub>2</sub> footprint than silicon<sup>(1)</sup>

**28% lower** lifetime CO<sub>2</sub> footprint for chargers / adapters<sup>(2)</sup>

**Accelerates** transition from ICE to EV by **3 years**, saving **20%/yr** of road-sector emissions by 2050 <sup>(3)</sup>

GaN saves up to **2.6 Gton / year** by 2050<sup>(4)</sup>  
SiC saves up to **3.4 Gton / year** by 2050<sup>(5)</sup>



May '22 World's first semiconductor company CarbonNeutral® certified



August '22 First 100,000 tons CO<sub>2</sub> saved



October '22 Recognized for industry-leading sustainability reporting

(1) Earth-Shift Global LCA, Navitas data. (1) Earth-Shift LCA. (3) DNV assessment based on LCA, Navitas data. (4,5) Navitas estimate based on DNV data, Yole projections, Navitas system estimates.