“Electrify Our World™”

Navitas
Energy • Efficiency • Sustainability

Stephen Oliver
VP Corporate Marketing & Investor Relations
stephen.oliver@navitassemi.com
GaN Video
[navi.tas] means...

**Energy**

- **Energy** to revolutionize power electronics
- **Energy** to accelerate change
- **Energy** to make a sustainable difference for our world
GaN is a high-speed semiconductor that switches up to 100x faster than Si and enables more efficient, smaller, lighter, cooler and lower cost systems; delivering 30-40% in energy savings.
Sustainability

By the 2050 timeline of the Paris Accord, GaN will address a 2.6 Gtons/year reduction in CO₂

- **Over 6.5 trillion** miles driven by an average car,
- **Over 6 billion** barrels of oil, or
- **650** fewer coal power plants

Source: Company information, DNV GL, EPA, IEA, International Renewable Energy Agency (IRENA)
Assumes 58.9% renewable electricity emissions reduction attributable to non-solar generation and 25% GaN share of Si replacement. Assumes 10% demand reduction, 50% efficiency improvement and 50% GaN share of Si replacement.
Once every 40 years...

**Second Revolution in Power**

- **Linear Regulators**
- **Switching Regulators**
- **HF Switching Regulators**

**Power Density (W/in^3)**
- (AC-DC converters ~300W)
- 0.1
- 1
- 10
- 100

- **Si BJT → Si FETs**
- New Magnetics
- New Controllers
- New Topologies

- **50 Hz**
- **30 kHz**
- **65 kHz**
- **1 MHz**

- **5x Increase in 10 years**
- **2x Energy Savings**
- **3x Lower $/W**

- **<10%/yr improvement over 30 years**

- **Efficiency**
  - 40%
  - 80%
  - 90%
  - 95-98%

- **Timeline**
  - 1977
  - 1987
  - 2014
  - 2017
  - 2027

- **New GaN Power ICs**
- New Magnetics
- New Controllers
- New Topologies

- **5x Increase in 10 years**

- **2x Energy Savings**
- **3x Lower $/W**
The Enabling Force

- Faster Switching 20x
- Smaller & Lighter 3x
- Energy Savings Up To 40%
- Higher Power Density Up To 3x
- Faster Charging 3x
- Lower System Cost 20%

Note: Statistical data is based on Navitas estimate of GaN-based power systems compared to Si-based systems in the 2024-2025 timeframe. Based on Navitas measurements of select GaN-based mobile wall chargers compared to Si-based chargers with similar output power. Relative to silicon, GaN has 10x stronger electrical fields and 2x greater electron mobility, enabling high voltages in fast chips and fast switching with high energy savings.
### GaN Integration Is Key To Speed, Efficiency And Size

Navitas’ proprietary integration unlocks GaN’s potential.

<table>
<thead>
<tr>
<th>Solution</th>
<th>Drive, Control &amp; Protection</th>
<th>Power</th>
<th>Speed</th>
<th>Passive &amp; Mechanical Components</th>
<th>Energy Efficiency</th>
<th>Size &amp; Weight Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Navitas</td>
<td>Compact, integrated solution</td>
<td></td>
<td>2MHz</td>
<td>Small / Light</td>
<td>92-95% (40% energy savings)</td>
<td>3x</td>
</tr>
<tr>
<td>GaN Power ICs</td>
<td></td>
<td></td>
<td>2MHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discrete</td>
<td></td>
<td></td>
<td>500kHz</td>
<td>Medium Size / Weight</td>
<td>88-92% (20% energy savings)</td>
<td>2x</td>
</tr>
<tr>
<td>GaN</td>
<td></td>
<td></td>
<td>500kHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silicon</td>
<td></td>
<td></td>
<td>100kHz</td>
<td>Large / Heavy</td>
<td>85-90%</td>
<td>1x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>100kHz</td>
<td></td>
<td></td>
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</tbody>
</table>

Note: Based on Navitas estimate for typical 65W mobile wall charger.
GaNFast™ Power ICs: Single, Half-Bridge

- “Digital In, Power Out”
- 650V/800V, 2MHz
- Monolithic integration
- GaN Power FET(s), GaN Driver, Control and Protection
- On-board regulators, hysteretic input, level-shift, bootstrap
- dV/dt control, UVLO, shoot-through & ESD protection
Leadership in:

Industry Experience & Impact

- 1st GaN power IC 2014
- 1st commercial planar MOSFETs (co-inventor)
- 1st integrated driver + FET
- 1st High-Voltage Power ICs
- 1st p-ch power MOSFET

300+ years of power semiconductor experience

- >$4B/yr revenue created
- 320+ patents
- 20+ generations of power semiconductors
- >5,000 power products
- 200+ technical papers

120+ employees, 70% of management with PhD, MSEE, MBA

News, May 7th 2021: “Navitas Semiconductor, the Industry Leader in Gallium Nitride (GaN) Power ICs, to Go Public at an Enterprise Value of $1.04 Billion via Live Oak II SPAC Business Combination”

[1] Based on cumulative professional experience of the Navitas senior management team. Navitas estimate based on co-founder accomplishments spanning their professional careers.
Leadership in: **Innovation**

- Industry inventor and pioneer for GaN power IC
- Multi-year lead over all other GaN suppliers
- 120+ patents
  - Proprietary AllGaN™ PDK
  - Integrated drive, control and protection with proprietary GaN power FET
- High-frequency packaging
- High-frequency systems

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**Device Development / Library**
- 650V eMode power FET
- 12-40V eMode power FET
- 650V dMode power FET
- 12-40V dMode power FET
- 2 DEG & 5C resistors
- Gate capacitors
- MIM / hybrid capacitors
- Over 20 devices developed

**Circuit Development / Library**
- Logic gates & latch
- Linear regulators
- Comparators
- Voltage sensors
- Charge pumps
- Bootstrap circuits
- Level-shifters
- Protection circuits
- Over 20 circuits developed

**Models & Simulation**
- Device & circuit models w/ <5% accuracy
- Ultra-fast system simulations (Simplis)
- Accurate and fast device, circuit and system models cut design time from weeks to days and reduce design cycles by 50-75%

**Characterization & Verification**
- Dedicated & automated characterization stations (wafer level, package)
- Safe Operating Area (SOA)
- Layout Design Rule Checker (DRC)
- Layout Versus Schematic (LVS)
- Layout Parasitic Extraction and simulation tool (LPE)
- Over 1M & characterized
# Overcoming Key Barriers To Entry

<table>
<thead>
<tr>
<th>Significant Barriers to Entry</th>
<th>Proprietary GaN IC</th>
</tr>
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<tbody>
<tr>
<td><strong>Manufacturability</strong></td>
<td>Stable &gt;90% Yields&lt;sup&gt;(1)&lt;/sup&gt;</td>
</tr>
<tr>
<td>Poor Manufacturing / Yields</td>
<td>Founding Team with 30+ Years of GaN Experience</td>
</tr>
<tr>
<td>Material mismatch (GaN / Silicon)</td>
<td>Fully-Qualified, &gt;1B Device Hours Tested, &gt;20M UBS Shipped&lt;sup&gt;(2)&lt;/sup&gt;, Zero Failures&lt;sup&gt;(3)&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Reliability</strong></td>
<td>Single Integrated IC Solution</td>
</tr>
<tr>
<td>Poor Reliability</td>
<td></td>
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<tr>
<td>Defect densities</td>
<td></td>
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<tr>
<td><strong>Complexity</strong></td>
<td></td>
</tr>
<tr>
<td>Extra System Components</td>
<td></td>
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<tr>
<td>Difficult to drive, control and protect GaN FET</td>
<td></td>
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<tr>
<td><strong>Cost</strong></td>
<td></td>
</tr>
<tr>
<td>High Manufacturing Costs 2x-3x Si</td>
<td></td>
</tr>
<tr>
<td>Limited GaN production capacity</td>
<td>Low GaN Manufacturing Costs</td>
</tr>
<tr>
<td></td>
<td>Volume, Integration &amp; Manufacturing Leadership</td>
</tr>
</tbody>
</table>

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<sup>(1)</sup> Based on Navitas production data over prior 6 months for highest volume products based on wafer-level and final test yield results.

<sup>(2)</sup> Based on cumulative production shipments through Q1 2021.

<sup>(3)</sup> Based on no customer-reported consumer failures for production shipments through March 2021.
Leadership in: Reliability

**Integrated Gate Reliability**

- Wide Range $V_{CC}$ (10-30V)
- Regulator ensures $V_{GS}$ within SOA
- No inductance or ringing in gate loop
- Protected gate (Not pinned out)

**Discrete GaN → GaN Power IC**

- Exposed gate
- Faulty switching
- Dangerous ringing & glitching
- Significant reliability risks
- Integrated gate drive
- Clean switching
- Safe, robust and reliable performance

**Reliability by Design**

- Total layout flexibility & simplicity
- UVLO protects driver & FET when full power unavailable

**Field-Proven Reliability**

<table>
<thead>
<tr>
<th>As of May 3rd, 2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>20,000,000</td>
</tr>
<tr>
<td>GaNFast power ICs shipped</td>
</tr>
<tr>
<td>46.4B</td>
</tr>
<tr>
<td>Device Hours in the Field</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>Field Failures</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>Field PPM</td>
</tr>
<tr>
<td>0.16</td>
</tr>
<tr>
<td>FIT Rate</td>
</tr>
<tr>
<td>5.8B</td>
</tr>
<tr>
<td>Equivalent Device Hours Tested</td>
</tr>
</tbody>
</table>

**Flyback Voltage Waveform**

- 900V Production Test
- 800V = Transient $V_{DS}$
- 650V = Continuous $V_{DS}$
- $V_{FBN}$ Derating
- $V_{FABN}$ Derating

... large drain voltage design margin
Leadership in: System Cost

Navitas GaN vs Silicon – $/W (1)

Navitas Advantage

Early Mover Advantage
High yields and low manufacturing cost(2)

New GaN Generations Every Year
Cost and performance improvements each generation

Increasing Levels of GaN Integration Every Year
Lower customer implementation costs

Faster GaN Performance Every Year
Smaller and lower cost external components every year

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(1) Navitas estimate comparing cost of GaN-based vs Si-based wall charger bill-of-materials cost (high-voltage power device, driver/controller, magnetics, PCB and case) for typical 65W mobile charger.

(2) Based on Navitas production release of 650V GaN power IC in Q3 ’18.
Leadership in:

**System Design, Capacity, Roadmap & Climate**

### System Design
- #1 in GaN, #1 in high-freq. power, #1 in planar transformer
- Shanghai, Hangzhou, Shenzhen, Los Angeles
- Dedicated customer support from concept to MP

**World’s smallest:**
- 50W PPS
  - 500 kHz
- 65W PD
  - 400 kHz
- 1kW 400V DC-DC ¾-brick
  - 825 kHz

### Roadmap
- New generation every 9-12 months
- 20-30% better cost/performance every generation
- Higher:
  - Frequency
  - Efficiency
- Integration
- Power density

### Capacity
- Production since 2018, #1 in GaN shipments
- >300% capacity increase planned for 2022
- 3-5x more die per wafer compared to Silicon

### Sustainability
- “Electrify Our World™”
- GaN can impact >33 Gtons of cumulative CO₂ reduction by 2050
- Navitas NetZero program
- CO₂ ‘Total Lifecycle Analysis’
  - GaN charger has 50% lower CO₂ footprint than silicon
- Target to support suppliers’ and customers’ sustainability goals
Energy, Efficiency & Sustainability Apply to All Markets
Generating Exciting Growth

Headcount, Valuation & Revenues

Future


World's Smallest 27W USB-PD
World's 1st GaN Half-Bridge Prototype
World's Smallest 25W USB-A
World's Smallest 27W USB-PD
World's Smallest 150W
3.2kW Data Center Prototype
World's Smallest 65W USB-PD
World's Smallest 65W
30+ Patents
30+ Patents
100+ Patents
120+ Patents

ANKER
AUKEY
RAVPPOWER

20,000,000 Shipped
Zero Failures
(May 3rd 2021)

World's Smallest 65W

NetZero CO₂ Program

100+

World’s Smallest 300W

Consumer
Enterprise
Renewables /Solar
EV / eMobility

75+
GaN Chargers In Mass Production

150+
GaN Chargers In Development
(MP 2021, H1'22)

90%+
Mobile OEMs Designing With Navitas GaN ICs

Note: Charger metrics as of March 2021.

VERIZON

ASUS

NVIDIA

BASEUS

F DELL

OPPO

LENOVO

BELKIN

REALME

SPIGEN

DENSITYPOWER

In Broad Markets & Applications

**Device Voltage (V)**

**Application Power**

- **GaN (Lateral)**
  - Solar Microinverters
  - TV, Game System
  - LED Lighting
  - All-in-One PC
  - Server Power
  - Laptop Adapters
  - Smart Home
  - Smartphone, Tablet Chargers

- **Si (Vertical)**
  - EV Inverters
  - EV On-board Chargers & DC/DC Converters
  - Solar String Inverters
  - Industrial Motors, Welders, UPS

- **SiC (Vertical)**
  - Wind Turbines
  - Utility
  - Traction

- **30V**
  - Low-Voltage DC/DC Converters

- **100V**
  - Mobile Wireless Power

- **300V**
  - SI

- **600V**
  - TV, Game System

- **1,200V**
  - Smartphone, Tablet Chargers

- **>3,000V**
  - 5G Base Station

- **1MW+**
  - LED Lighting
  - All-in-One PC
  - 5G Pico Cell

- **100kW**
  - EV Inverters

- **10kW**
  - TV, Game System

- **1kW**
  - LED Lighting

- **100W**
  - All-in-One PC

- **10W**
  - Low-Voltage DC/DC Converters

- **1kW**
  - Laptop Adapters

- **100W**
  - 5G Pico Cell

- **10kW**
  - Smart Home

- **100kW**
  - TV, Game System

- **1MW+**
  - Smart Home

- **100kW**
  - Laptop Adapters

- **10kW**
  - EV Inverters

- **1MW+**
  - Solar String Inverters

- **100kW**
  - Wind Turbines

- **10kW**
  - Industrial Motors, Welders, UPS

- **1MW+**
  - All-in-One PC

- **100kW**
  - TV, Game System

- **10kW**
  - Solar String Inverters

- **1MW+**
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- **100kW**
  - Solar String Inverters

- **10kW**
  - Wind Turbines

- **1MW+**
  - Wind Turbines
GaN ICs Address a $13B TAM

GaN Grows 20x Faster Than Total Power Semi TAM\(^{(1,2)}\)

GaN 2026 TAM\(^{(2)}\)

- **$13.1B**
  - $150M
  - $724M
  - $189M
  - $139M
  - $293M
  - $575M
  - $2.1B\(^{(3)}\)

GaN Market Penetration

- **2020**: 0.3%
- **2026**: 15.9%

**Notes:**

1. GaN IC potential market based on voltage rating of 80V – 1,000V derived from Yole Développement, Status of the Power Electronic Industry 2020.
3. Reflects midpoint of forecasted 2026 market size range of $1.6 billion to $2.6 billion.
Join the GaN Generation!

Team Navitas

Power Electronics Partners

Design Houses

Customers

Manufacturing Partners

Consumers

Investors

Environmental Groups

Universities

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Let’s go GaNFast