# Vermont Gallium-Nitride (V-GaN) Semiconductor Tech Hub

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Vermont GaN Tech Hub

TECH HUBS
U.S. Economic Development Administration
OFFICIAL DESIGNEE
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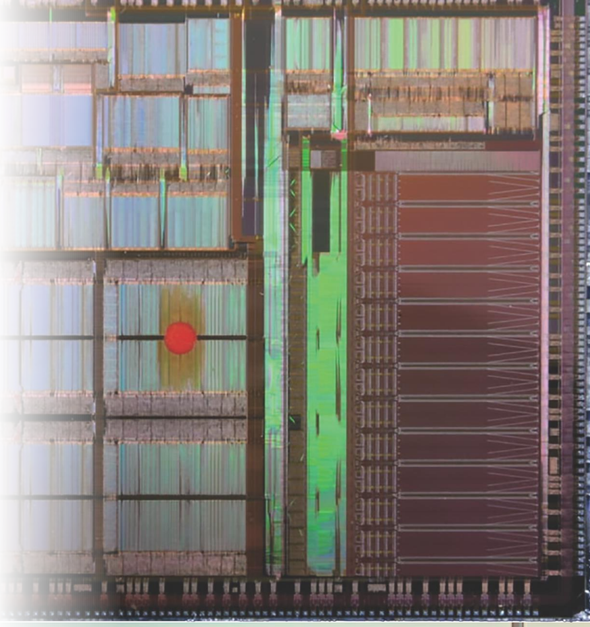
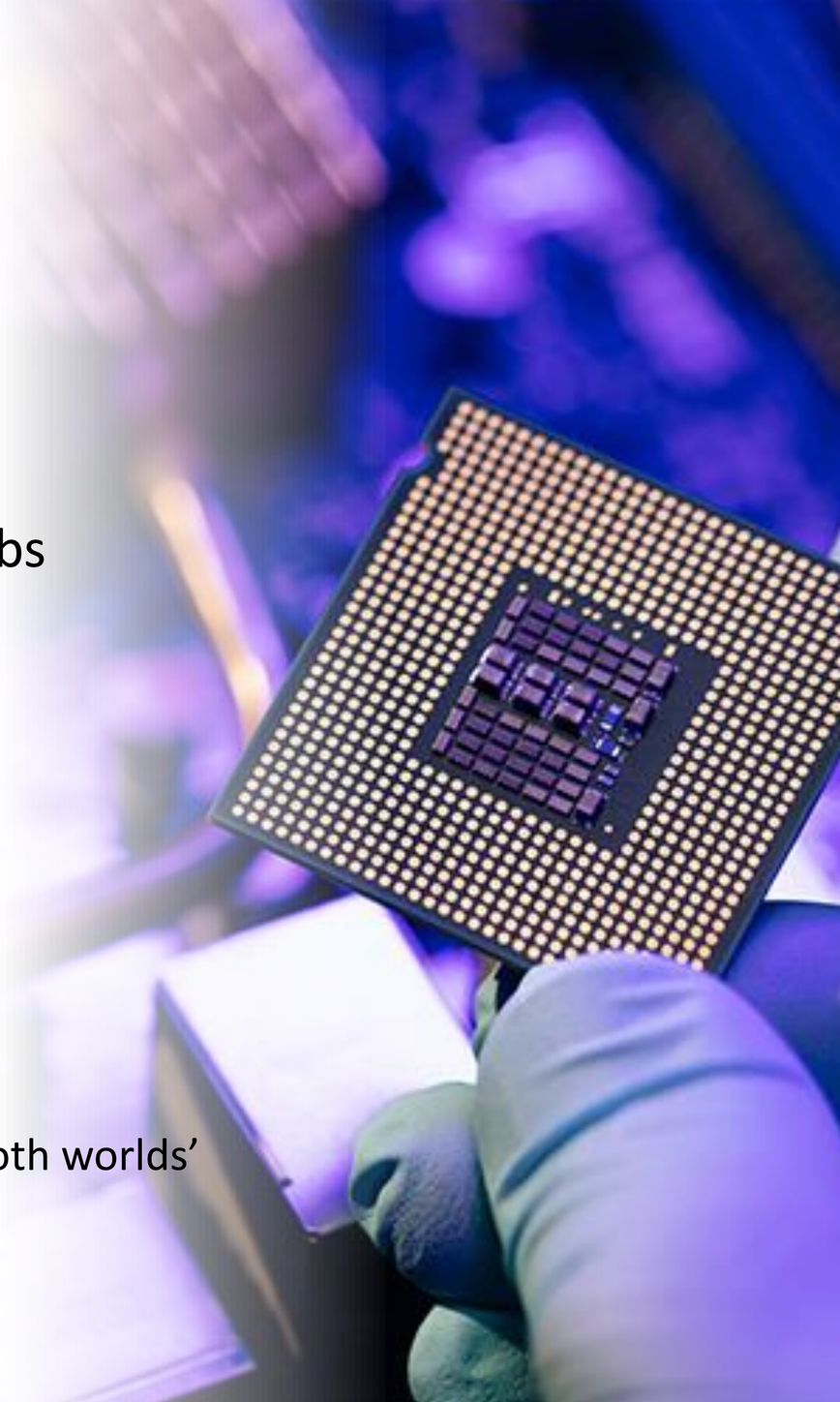
# What is GaN?

- Gallium Nitride (GaN) is a wide bandgap semiconductor substrate:
  - High electron mobility (low on-resistance, high switching speed)
  - High breakdown voltage
  - Low temperature sensitivity
- Applications
  - LED (commodity)
  - High power devices
    - Motor controllers, inverters, battery chargers, solid state switches
  - High frequency devices
    - RF amplifiers
    - Cellular switches
    - Audio amplifiers



# Global Foundries GaN Plan

- Fab 9 Capabilities
  - 200mm, high volume fab
  - Existing GaN providers running on 150mm and 100mm fabs
    - Fewer processing steps available at volume – single device chips
    - More complex devices run on very low volume equipment
  - GF has expertise in analogue discrete device production
    - (inductors, capacitors, resistors)
    - Will allow ‘circuits’ to be produced on GaN substrates
  - GF has experience in complex hybrid packaging
    - ‘Flip Chip’ technology to marry CMOS and GaN and get ‘best of both worlds’



# V-GaN Tech Hub Value Add

- Attract design and development activity into this region
- Start with a closed loop design-build-test rapid iteration
  - Products that go through the tech hub are at the ‘front of the line’
  - Designers, EDA (software) providers, and GF advances technology faster
  - Region develops cadre of engineers and designers uniquely skilled
- Students and researchers come to UVM, Norwich, Dartmouth to collaborate
- Startups established with new IP and innovations
- Existing companies establish design centers in the region

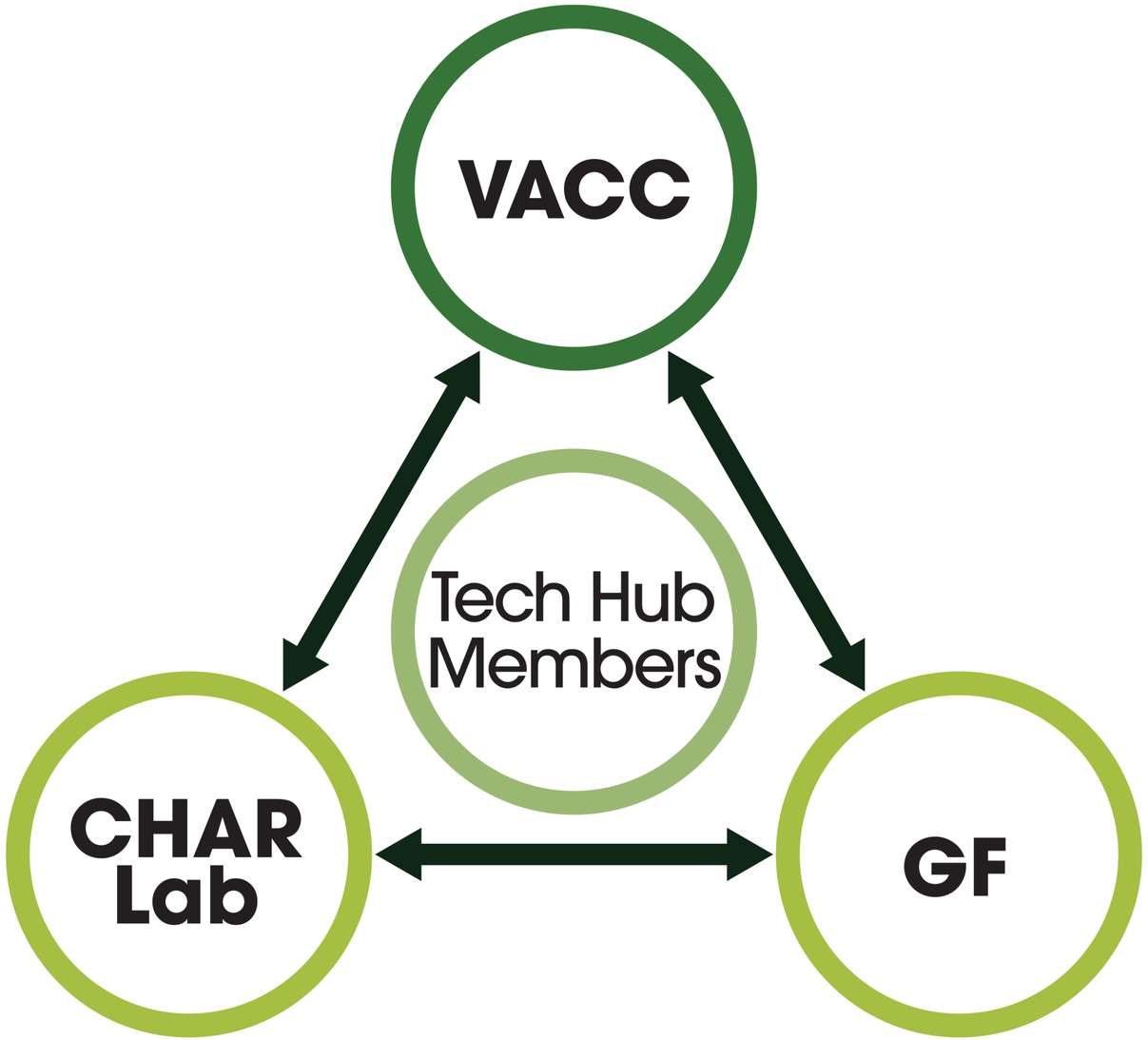
# V-GaN Tech Hub is ‘Vermont Scale’

- No new Fab….Minimal building required
- Distributed, dispersed job growth
- Can spread across region along our dedicated fiber network
- High paying jobs at all skill & education levels
- Allows us to do ‘our part’ to improving national competitiveness in energy efficiency, communications, and security

# What Will it Look Like?

- Phase I: Building Blocks
  - GaN Semiconductor Design Center housed at UVM Advanced Computing Center
  - GaN Device Characterization Laboratory
  - Comprehensive Workforce Development Program (5 Tracks)
  - Exemplar prototype project to tie elements together
- Phase II
  - Numerous application development and scale up projects
  - Automation and test equipment innovations to support GaN development
  - Local design offices for global firms selling power and communications chips
- Phase III
  - Startup Companies will form to capitalize on new opportunities discovered here
  - Manufacturing facilities will spool up to build the products developed in Phase II
  - The Tech Hub is self-sustaining, supported by local firms in ecosystem

# Tech Hub Closed Loop




VACC: Vermont Advanced Computing Center
CHAR LAB: Characterization Laboratory
GF: Global Foundries

# What Will it Look Like?

- Jobs
  - Highly compensated at all education levels
  - Upward mobility for current residents
  - Pathways for under-represented residents
  - Provide incentive for younger population to come (& stay!)
- Technology
  - Unique capabilities for national security
  - Opportunity to advance green energy industry
- Education
  - Industry support to help education system

# What Do We Need Now?

- EDA Tech Hub Funding for Closed Loop System
  - Feb 29 submission date
- Need state support.  Funding commitments
- Need federal support
  - DoD
  - DoE
- Need Corporate Support
  - Defense
  - Existing Semiconductor
  - Commitment to Tech Hub-projects, funding

- Learn more at www.vgan.tech