

EMPOWERING THE RENEWABLE GRID

Driving Efficiency, Reliability, and Density in Solar String Inverters

The global transition to renewable energy is placing solar string inverters at the center of the modern grid. As solar installations scale from residential rooftops to massive utility-grade farms, these critical power conversion systems must evolve to handle higher voltages, faster switching speeds, and increasingly complex grid interaction requirements. This transformation is being accelerated by the push for 1500V system architectures and the adoption of wide-bandgap semiconductors to maximize energy harvest and grid stability.

Designers face the critical challenge of optimizing efficiency and thermal performance while minimizing physical footprint. High-voltage string inverters require robust isolation and ultra-low loss current sensing to ensure precise Maximum Power Point Tracking (MPPT) and safe grid synchronization. Additionally, these systems must operate reliably in harsh outdoor environments, enduring extreme temperature fluctuations and electrical noise. This necessitates compact, rugged components that offer high-voltage isolation and immunity to electromagnetic interference to ensure continuous, safe operation over a long service life.

What you can achieve with Allegro solutions

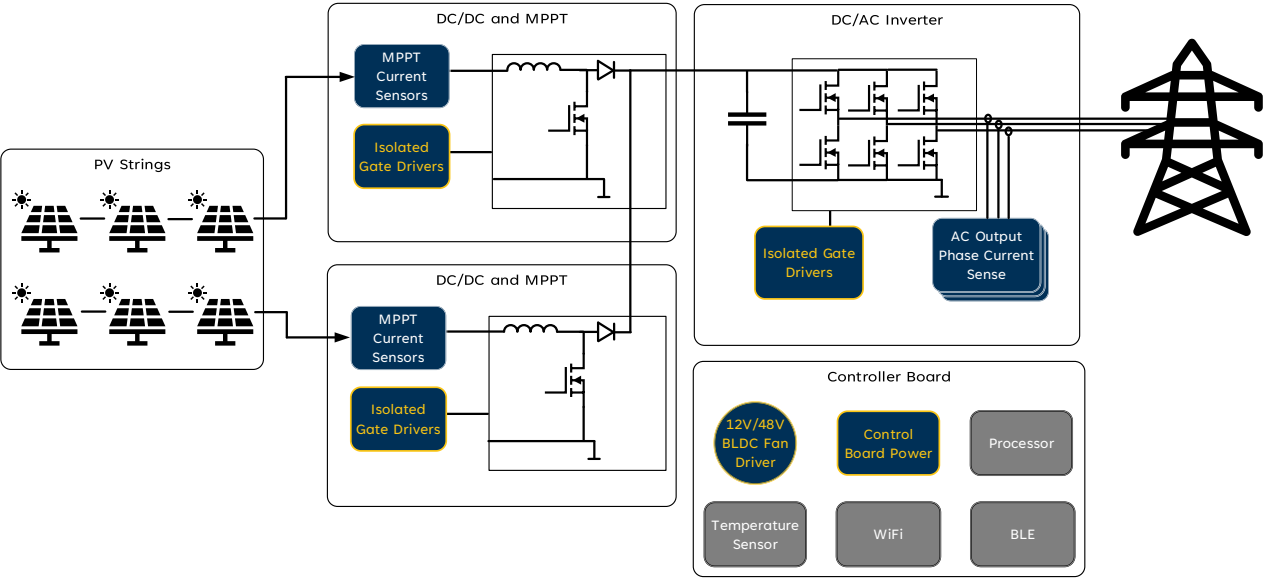
- **Maximize Energy Harvest & Efficiency:** High-bandwidth, low-noise current sensors enable precise MPPT control loops, ensuring every watt of available solar power is captured. Coupled with high-efficiency isolated gate drivers for SiC and GaN switches, Allegro solutions minimize switching losses and heat, boosting overall system efficiency.
- **Enhanced Safety & Grid Reliability:** Robust sensors feature reinforced isolation and stray field immunity to ensure accurate monitoring even in noisy high-voltage environments. This reliability is critical for detecting ground faults and maintaining stable grid synchronization under varying load conditions.
- **Simplified Design & Reduced System Cost:** Highly integrated and compact ICs drivers significantly reduce the BOM and PCB footprint. This simplifies the high-voltage insulation design and lowers manufacturing costs while maintaining industry-leading performance standards.



The urgent demand for clean energy and grid modernization is driving rapid innovation in photovoltaic power conversion and energy storage integration.

Allegro's market-leading current sensors and isolated gate drivers reduce system power loss and enhance thermal management, directly increasing energy throughput. Our robust, automotive-grade heritage ensures the high-voltage safety and long-term reliability required for critical renewable energy infrastructure.

Block Diagram



Key Products and Solutions

Subsystem	Component	Allegro Parts	Key Differentiator
DC/DC and MPPT	Current Sensor	ACS71010	Delivers superior signal integrity in noisy high-voltage environments through reinforced isolation and differential current sensing
	Isolated Gate Drivers	AHV85110/1	Simplifies design and reduces BOM complexity by eliminating external bias supplies via self-powered isolation technology
DC/AC	Current Sensor	ACS37035	Enables high-efficiency GaN and SiC architectures with extreme bandwidth tailored for fast switching control loops
	Isolated Gate Drivers	AHV85110/1	Simplifies design and reduces BOM complexity by eliminating external bias supplies via self-powered isolation technology
Controller Board	Fan Driver	A5932	Enhances cooling reliability and acoustics with vibration-free, sensorless sinusoidal commutation
	Board Power	APM81815	Ensures stable auxiliary power by handling high-voltage DC bus transients with an exceptionally wide input voltage range



To learn more about the Allegro family of products and to explore available design resources, visit allegromicro.com