

SiC Power Electronics

Aegis Electronics delivers high-efficiency, compact SiC power solutions, including power modules, DC-AC inverters, and DC-DC converters, for diverse power systems, with advantages in high energy efficiency, size, and weight. The market segments include: • Defense and Aerospace • Energy storage • Hybrid electric drives for vehicular transportation • Power generation • Renewable energy including solar and wind applications Technology

Since 2002, Aegis team has developed leading expertise in high-temperature silicon carbide (SiC) electronics and packaging supported by internal research and SBIR/STTR contracts comes from U.S. Department of Defense (DoD), NASA, and Department of Energy (DoE).

Aegis Electronics employs a range of advanced process techniques to support its SiC work, including ceramic-to-metal, carbon-to-ceramic, and carbon-to-metal brazing, as well as high-temperature interconnections and soldering. The company also performs metallization on AlN and Si₃N₄ substrates and utilizes wire bonding to ensure reliable, high performance electronic assemblies. Aegis Electronics provides customized design and prototyping of a wide range of SiC power electronics products tailored for demanding applications. These include packaged SiC switches, available as single devices or arrays mounted on aluminum nitride (AlN) or silicon nitride (Si₃N₄) substrates with copper, gold, or molybdenum metallization.

The company also develops robust SiC power modules in configurations such as single-phase, three-phase, half-bridge, and full-bridge designs, including six-pack and half-bridge modules using alumina (Al₂O₃), AlN, or Si₃N₄ substrates, with power ratings from 1 kW to 100 kW. In addition, Aegis designs SiC-based and hybrid SiC/Si DC-AC inverters and DC-DC converters that integrate power modules, high-temperature packaging, efficient heatsinks. Complementing these systems are high-temperature, high-frequency gate drivers engineered specifically for SiC power devices.

Aegis Electronics specializes in advanced thermal management systems for SiC power electronics, combining innovative materials with engineered designs to enable high power density and high-temperature operation. Its solutions include highefficiency heatsinks utilizing microchannels, microjet cooling, porous media such as aluminum and graphite foam, heat pipes, and phase change materials, as well as graphite foam and carbon-carbon heat exchangers for effective heat dissipation.