

## High-Reliability Actuation and Motor Drive Applications



Power Core Module

Hybrid Power Drive

Power Modules

SiC MOSFETs

SiC Schottky Barrier Diodes

# Increasing Use of Electronics in Electrical Actuation & Motor Drive Systems

Recent technological advancements in the field of wide band gap SiC power electronics have initiated the replacement of hydraulic actuators with lighter electro-hydrostatic and electro-mechanical actuators in flight control systems for fuel savings through weight reduction. These features are also advantageous for space thrust vector control, where excess weight can cost a launch system up to \$10,000/kg.

The key technology drivers for high-reliability electrical motor drive systems will continue to be lower weight, higher reliability, improved power efficiency and thermal management.

Microsemi's growing capability as an integrated power solutions provider offers the best cost-of-ownership for our customers and partners. We offer fully integrated state-of-the-art power, hybrid, and digital and mixed-signal technologies to offer highly integrated, high-reliability, flexible and scalable solutions for different applications.



## Applications

- Flight control actuation systems
- Thrust vector control
- Pumps
- Landing gear
- Missile actuation

## Microsemi Benefits

- Fully integrated solution capabilities
- System size and weight reduction
- Reduced time to market through qualified design building blocks
- SiC or IGBT based solutions
- Flight-proven building blocks available
- Available in both standard and custom packages

## Heritage

- Commercial aviation
- Space launch systems
- Military aviation
- Missiles

## Qualification and Reliability

- DO-160
- DO-254
- Extensive life and HALT testing
- Partial discharge tested

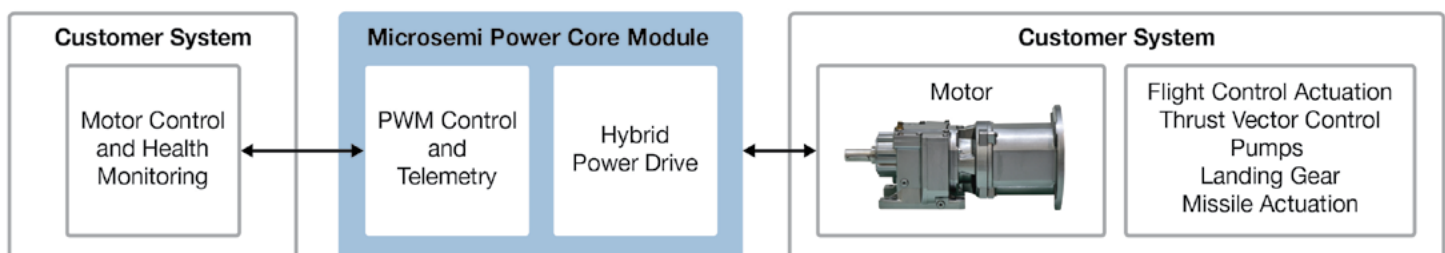
## High-Reliability Aerospace and Defense Heritage

### Motor Drive Power Solution

The Microsemi technologies underlying the Integrated Power Solutions™ product portfolio have been used in all major commercial, military, and space platforms for decades. With our broad product and capability portfolio and a proven track record of success, we are well-positioned as a key partner in high-reliability applications.

We continue to leverage our technology and capabilities in the aerospace power segment to offer lighter and more efficient solutions with increasing levels of reliability.

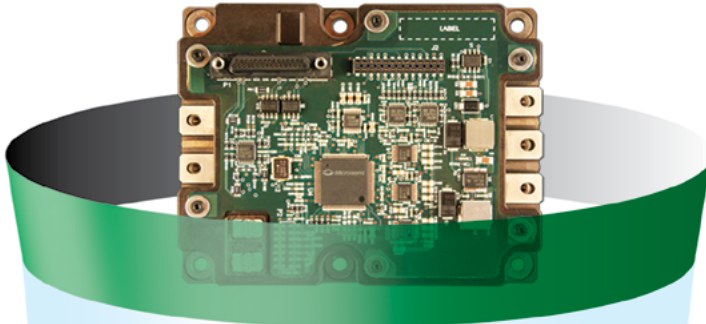
Microsemi has evolved to become a leading-edge power and motor drive solutions provider for the most demanding aerospace applications.



# System Solutions to Components

## Power Core Module

The power core module (PCM) combines our hybrid power drive (HPD) with our control/telemetry platform to create highly integrated solutions for high-reliability actuation and motor drive applications. Our customers use this platform with their control and health monitoring expertise, resulting in weight reduction for many critical applications. For more information visit [www.microsemi.com/pcm](http://www.microsemi.com/pcm)



### Features

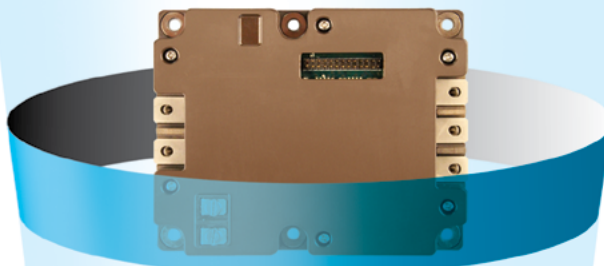
- PWM control and telemetry integrated with HPD
- LVDS interface
- Greater than 99% efficiency
- High frequency power switching
- 3-phase bridge topology
- SiC MOSFET or IGBT solutions

### Benefits

- Highly integrated motor drive solution
- Qualified using DO-160 test standards
- Reduced weight and solution size
- Reduced system cost and shorter time to market

## Hybrid Power Drive

The hybrid power drive (HPD) includes a three-phase power stage, drive and bias circuitry, and telemetry monitoring. The HPD is available in various configurations, power levels, and form factors. For more information visit [www.microsemi.com/hpd](http://www.microsemi.com/hpd)



### Features

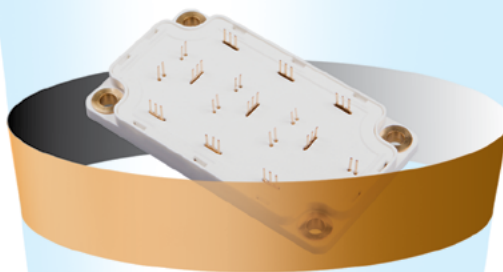
- 540 V or 270 VDC operation
- Up to 20 kVA
- SiC MOSFET or IGBT-based solutions
- Various signal and power interface options
- Optional solenoid drive and regeneration capability
- Hall effect or shunt current sensing
- Integrated temperature sensing

### Benefits

- Integrated gate drive and power stage
- Qualified using DO-160 test standards
- Leveraging 10M+ flight hours of power hybrid technology
- 100% partial discharge tested

## Power Modules

Microsemi's aerospace-grade power modules provide the capability to exponentially increase power density through hybrid integration. For more information visit [www.microsemi.com/sicmodules](http://www.microsemi.com/sicmodules)



### Features

- AlSiC baseplate for enhanced thermal cycling
- DBC on AlN or AMB on Si<sub>3</sub>N<sub>4</sub> substrate
- Aerospace grade silicone gel coating (-60°C to 125°C)
- Various power topology options available using SiC or IGBT
- Low profile, low inductance solutions

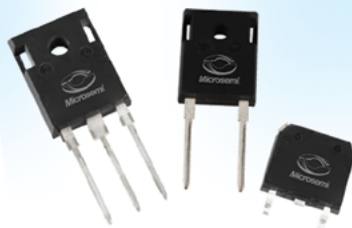
### Benefits

- Improved reliability and thermal conductivity
- 40% lower weight
- High-speed switching capability

## Rugged Next Generation Silicon Carbide (SiC) Components

Microsemi's next-generation Silicon Carbide (SiC) semiconductors are designed for extreme ruggedness.

For more information visit [www.microsemi.com/sic](http://www.microsemi.com/sic)



### Features

- Schottky Barrier Diodes (SBD) and MOSFETs
  - 700 V, 1200 V, and 1700 V
- AEC-Q101 qualified
- Designed for Extreme Ruggedness
  - High repetitive unclamped inductive switching (UIS) rating
  - High short circuit rating 3 – 5  $\mu$ s for MOSFETs

### Benefits

- Improved power density over IGBT Si solutions
- Higher efficiency and size reduction



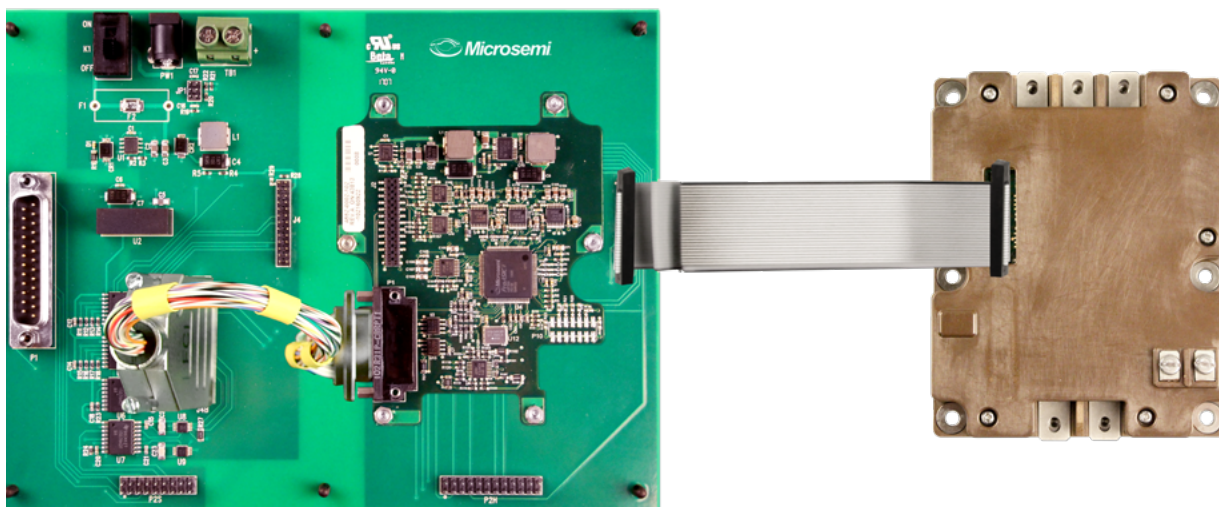
# Flexible Integrated Power Solutions

Our Aerospace Integrated Power Solutions team can also provide custom solutions using our flight-qualified high-reliability building blocks. Example customization options:

- Higher power scalability
- Inrush current protection
- Various power stage topologies
- Regeneration and/or solenoid drive
- Various signal and power interface options
- Various approaches to health monitoring (current, voltage, and temperature)



Evaluation Kit Available



For more information, please email [AerospaceIPS@microsemi.com](mailto:AerospaceIPS@microsemi.com)

Power Core Module (PCM) – [www.microsemi.com/pcm](http://www.microsemi.com/pcm)

Hybrid Power Drive (HPD) – [www.microsemi.com/hpd](http://www.microsemi.com/hpd)



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