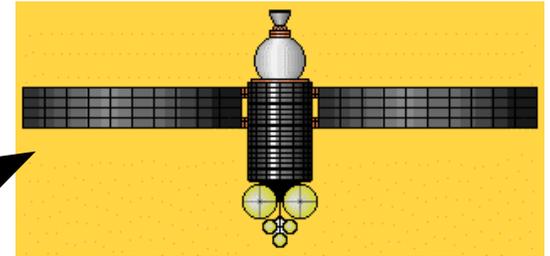


Commercial &
High-Performance Aerospace



Commercial & Planetary Spacecraft



**SiC High Temperature,
High Power
Electronics**

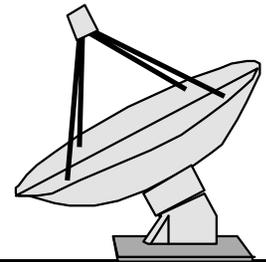
Gasoline & Electric
Transportation



Public Power Generation & Distribution



Microwave
Communications & Radar



Property

Benefit

Wide Energy Bandgap
(6H-SiC = 3.0 eV, 4H-SiC = 3.2 eV)

600 °C Electronics,
Extremely Low Leakage Devices

High Breakdown Field
(~ 10X of Silicon)

Superior Power Electronics,
Radiation Hardened Devices

High Thermal Conductivity
(~ 3X of Silicon)

Simpler Heat Rejection Schemes,
Increased Power Density

Excellent Physical Stability

Sustained Use in Hostile
Environments

Processing Similarities to Silicon

Potential for Rapid Commercial
Development

Vastly improved systems enabled by unique SiC device capabilities.

High power, somewhat high-f RF, $T < 125$ °C system ambient.

HDTV, radar, communications.

MESFET's, SIT's, Schottky diodes.

High power switching, $T < 125$ °C system ambient.

Electric motor-drives, high-voltage power transmission & conversion.

Reduced thermal management, reduced system size, increased efficiency.

2-terminal (diodes) & 3-terminal (MOSFET, IGBT, etc.) power switches.

High power switching, $T > 200$ °C ambient.

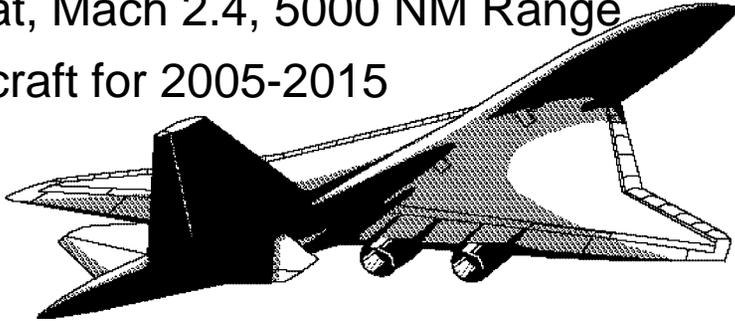
Aerospace electric actuators.

2-terminal (diodes) & 3-terminal (MOSFET, IGBT, etc.) power switches.

Digital and analog signal circuits, $T > 300$ °C ambient.

Instrumentation & control electronics for aerospace, automotive,
and industrial process monitoring.

300 Seat, Mach 2.4, 5000 NM Range
600 Aircraft for 2005-2015



After Carlin & Ray, 2nd HiTEC, Charlotte, NC, 1994

Conventional Control System (Without High Temperature Electronics)

Each actuator requires 17-26 wires

Average wire run ~ 100 ft.

System wire run weight ~ 600 lbs.

~ **10,000 Connector Pins**

Distributed Control System (With High Temperature Electronics)

Control signal multiplexing

System wire run weight < 50 lbs.

~ **1,000 Connector Pins**

Wiring & connector problems are #1
cause of propulsion maintenance
action in commercial aircraft today!

