

CONNECTING, PROTECTING AND POWERING THE WORLD

# Solutions

## e-BIKES



COMMUTER



CARGO



e-MOBILITY



TERRAIN

### FEATURING

Motor Control  
Battery Management

QORVO

qorvo

CONNECTING,  
PROTECTING  
AND POWERING  
THE WORLD

# e-BIKES EXAMPLES

COMMUTER



CARGO



e-MOBILITY



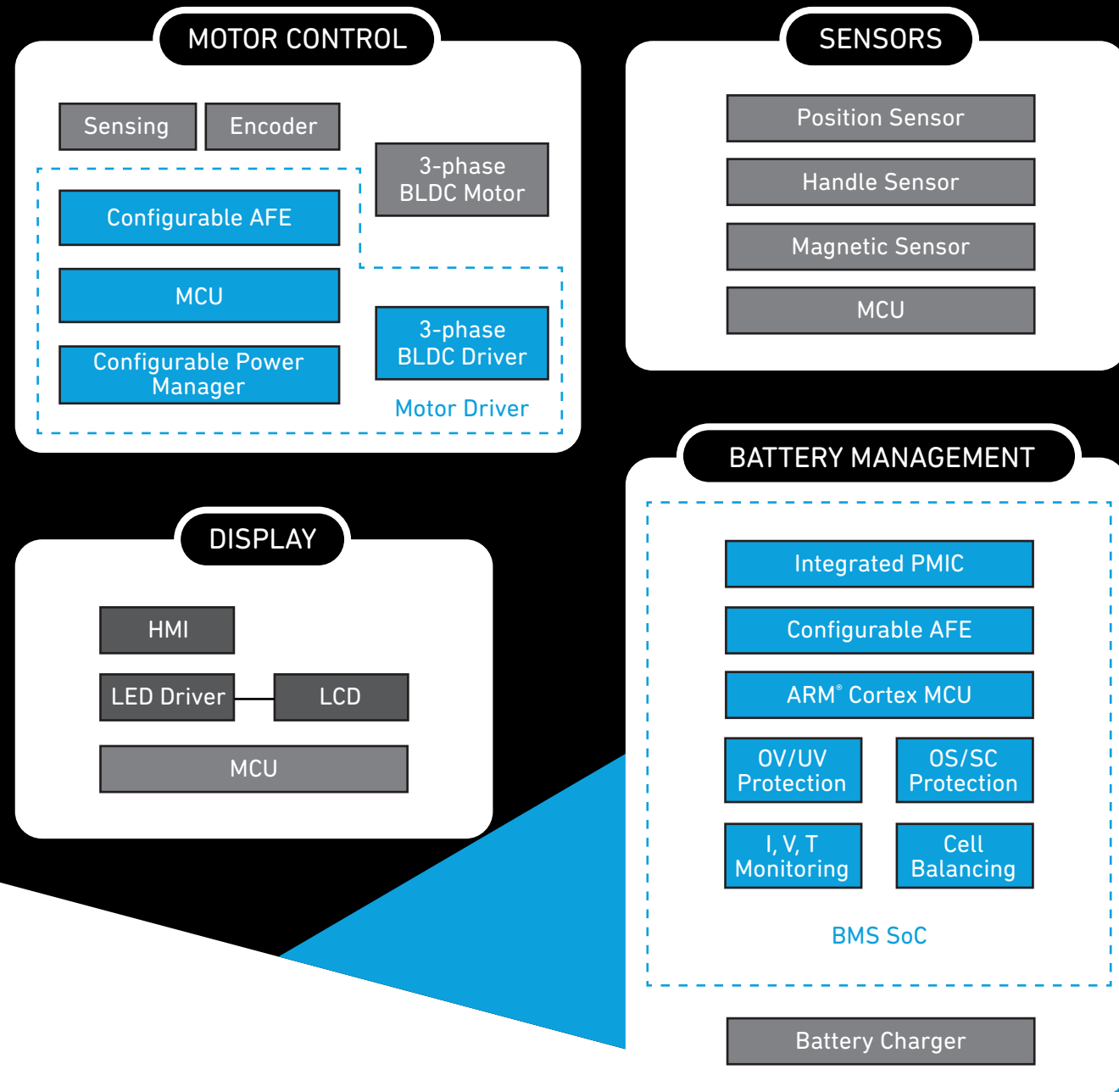
TERRAIN



## High Level Design Considerations

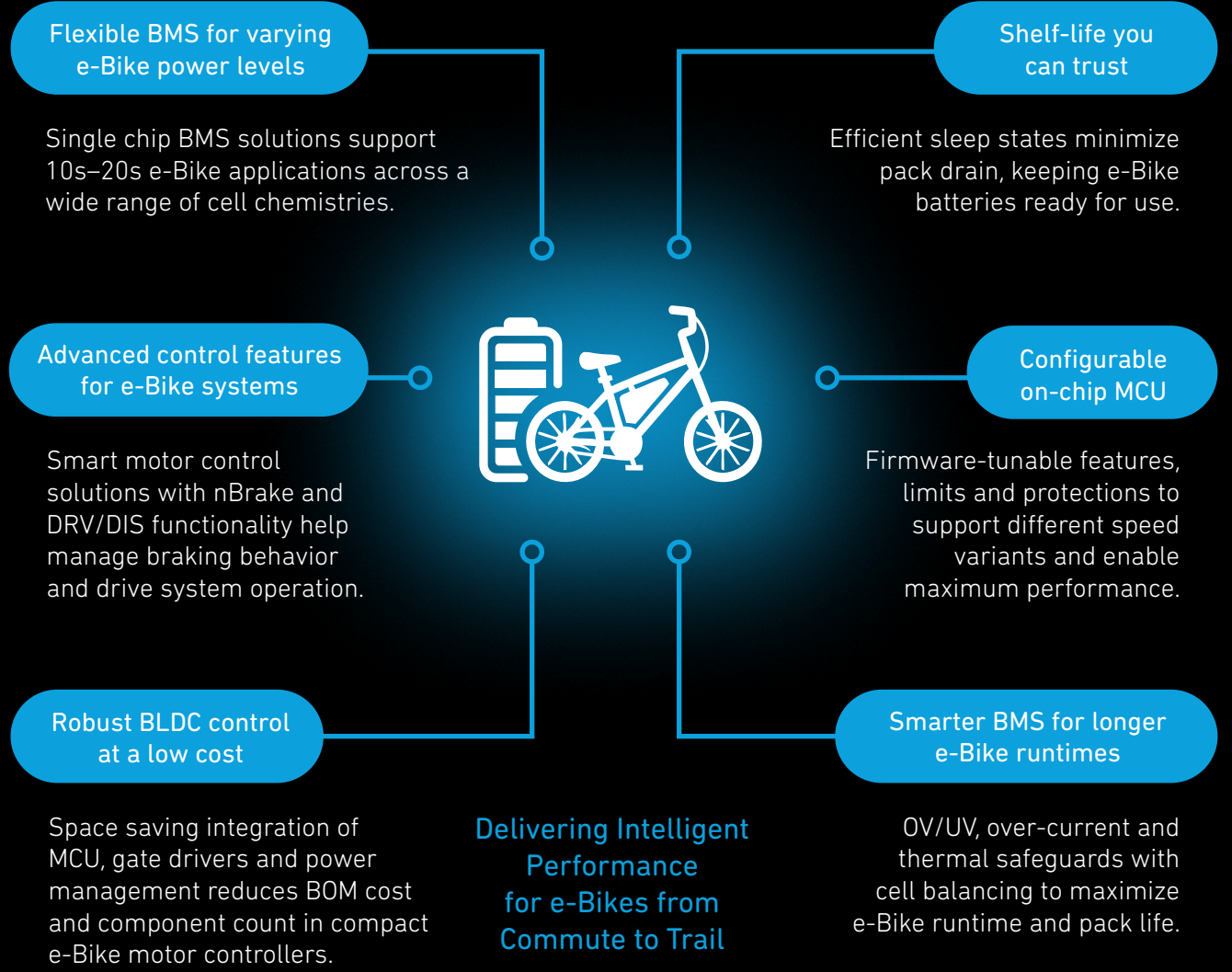
- ✓ **Drive Performance:** Distance • Speed • Performance
- ✓ **Battery Efficiency:** Energy use • Ride time • Charge frequency
- ✓ **Power Management:** Voltage stability • Load balance • Battery life
- ✓ **Motor Control:** Torque • Acceleration • Pedal assist

# e-BIKE BLOCK DIAGRAM



# BRIDGING GAPS WITH INNOVATIVE SOLUTIONS

## For Today's Challenges



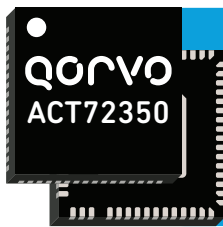
Look for blue blocks!

Qorvo content shown in blue blocks



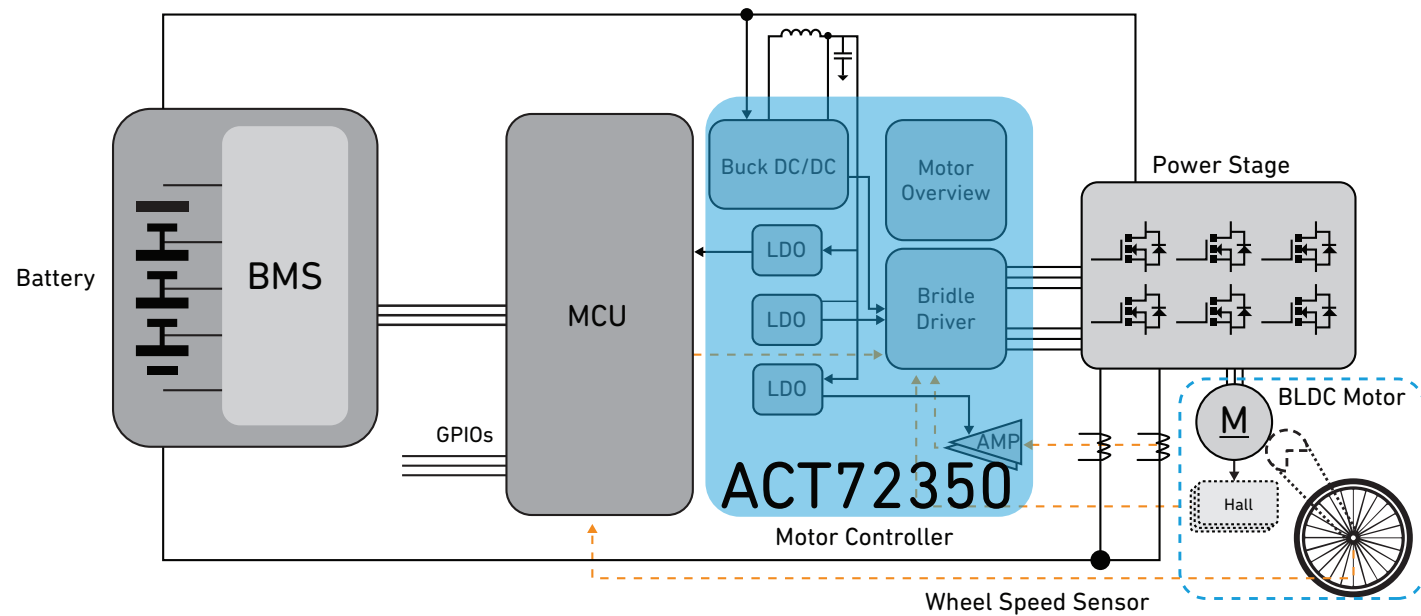
# MOTOR CONTROL

## Driver



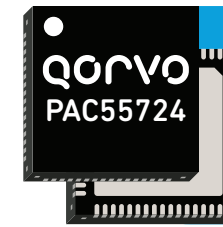
160V 3-Phase BLDC Motor Driver with Integrated Power Manager and Configurable AFE

- 160V-rated gate drivers: compatible with 48-100V systems
- Integrated power management: reduce PCB size and BOM cost
- Hibernate mode (19uA @ 56V): extend battery life
- Precise current sensing (CAFE): smooth torque control
- Autonomous breaking feature
- Overcurrent and overtemperature protection
- AEC-Q100 rated



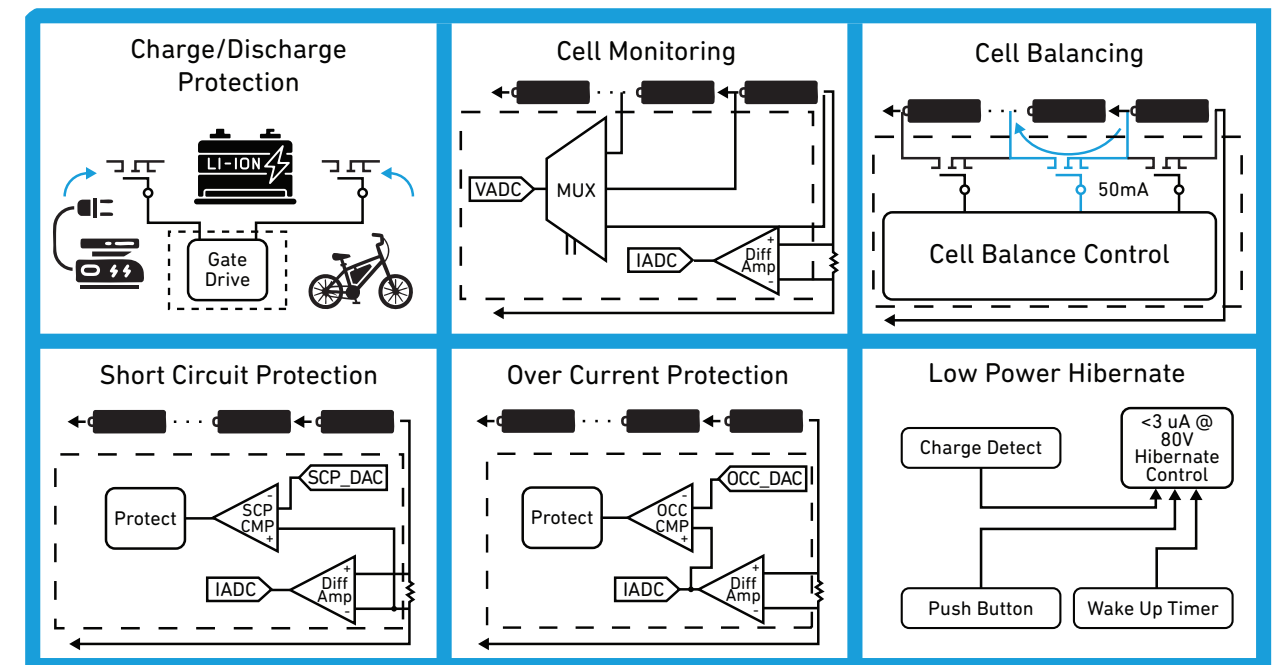
# MOTOR CONTROL

## Controller & Driver



72V BLDC Motor Controller and Driver with Integrated Multimode Power Manager and Configurable AFE

- 150 MHz ARM Cortex M4F
- 128 kB Flash, 32 kB SRAM
- 72V Buck/SEPIC DC/DC controller with external NCH FET
- 5V/200 mA system supply
- 3 high-side 72V 1.2A (source)/1.8A (sink) gate drivers
- 3 low-side 20V 1.2A (source)/1.8A (sink) gate drivers
- Advanced cycle-by-cycle protection
- 3 x differential PGA (x1 to x48)
- 4 x single PGA (x1 to x48)



# BATTERY MANAGEMENT

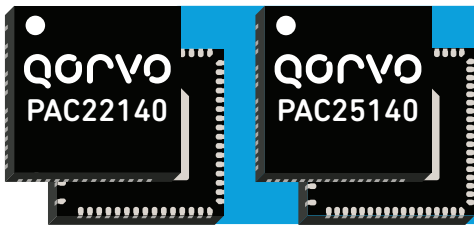
## System on Chip



LEARN MORE



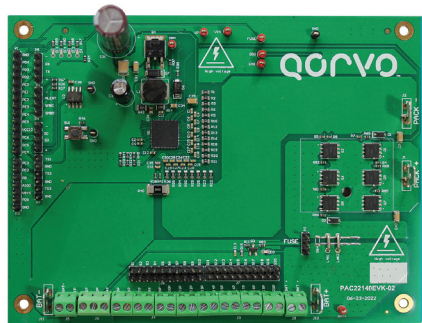
LEARN MORE



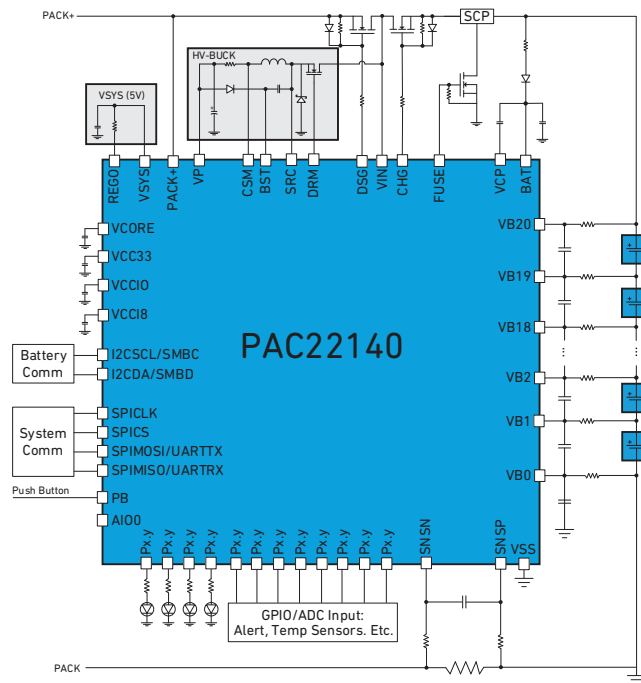
Up to 20s Intelligent Battery Management SoC with ARM Cortex MCU, Integrated PMIC and BMS AFE, Including Cell Balancing

- Fully programmable industry-standard ARM
  - PAC22140 50 MHz Arm-M0 32 kB Flash/8 kB SRAM
  - PAC25140 150 MHz Arm-M4F 128 kB/32 kB SRAM
- Three ADCs for monitoring key parameters
  - 16-bit SD ADC for current sense with differential PGA
  - 16-bit SD ADC for voltage sense and cell balancing
  - 10/12-bit SAR ADC for additional voltage/temperature sense

- Complete power solution
  - 145V DC/DC buck
  - 5V 225mA
  - 3.3V 90mA
  - MCU  $V_{core}$



Single IC required for complete BMS solution



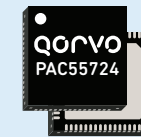
# PARTS OVERVIEW

Motor Control



160V 3-phase BLDC Motor Driver with Integrated Power Manager and Configurable AFE

Motor Control



72V BLDC Motor Controller and Driver with Integrated Multimode Power Manager and Configurable AFE - Extended I/O

Battery Management



Intelligent Battery Management SoC with Integrated ARM Cortex-M0 MCU Cell Balancing

Battery Management



Intelligent Battery Management SoC with Integrated ARM Cortex-M4F MCU and Cell Balancing

The Qorvo logo is rendered in a white, lowercase, sans-serif font. It is positioned in the bottom-left corner of the page, set against a dark blue diagonal background element. The logo consists of the letters 'q', 'o', 'r', 'v', and 'o' in a clean, modern typeface.

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