

## SiC Power Supply Use Case: Traction Inverters

This use case examines the application of the [MPQ18913](#) in [traction inverters](#).



The [MPQ18913](#) is a 30V, 0.3A, LLC gate driver isolated bias supply with a wide configurable  $f_{sw}$  range that offers an alternative to traditional [flyback converters](#) for designing traction inverters.

Traction inverters convert the DC power of the battery in electrical vehicles (EVs) into a three-phase half-bridge to drive the motor's speed and torque. Flyback converters are an established topology for creating an isolated bias supply to provide power to SiC or IGBT power devices. These voltages typically range between 15V and 20V on the positive rail and between -8V and 0V on the negative rail.

Limitations of flyback topology include lower switching frequency ( $f_{sw}$ ) and the tradeoff between high isolation voltage and the amount of interwinding capacitance introduced by the transformer, where the capacitance can cause voltage spikes and additional loss. These limitations make it difficult to design power supplies with an 800V architecture that require a higher isolation voltage for the new generation of EVs.

Resonant topologies with an LLC topology are becoming more common to generate the power supply for biasing silicon carbide (SiCs) and insulated-gate bipolar transistors (IGBTs). The LLC topology features soft switching to achieve improved EMI performance as well as low interwinding capacitance from the transformer's leakage inductance that is used as part of the resonant tank.

The [MPQ18913](#) is a 30V, 0.3A, LLC gate driver isolated bias supply with a wide configurable  $f_{sw}$  range that offers an alternative to traditional [flyback converters](#) for designing traction inverters. This driver can substantially decrease the size of a silicon carbide power supply due to the high  $f_{sw}$  that can reach up to 5MHz. As a result, smaller magnetics such as the transformer can be achieved in addition to reduced input and output capacitances. The MPQ18913 also provides a soft switching topology and frequency spread spectrum (FSS) that decreases EMI and improves overall efficiency. The MPQ18913 is available in AEC-Q100 Grade 1.

Additional features include:

- High Performance:
  - Supports Up to 6W of Output Power ( $P_{OUT}$ )
  - 5V to 30V Input Voltage ( $V_{IN}$ ) Range
  - Spread spectrum for enhanced EMI performance
- Robust Design for Automotive Environments:
  - -40°C to +150°C Junction Temperature ( $T_J$ ) Range
  - Available in a Tiny QFN-10 (2mmx2.5mm) Package
  - Available in a Wettable Flank Package to Enable Optical Inspection

For more information, discover MPS's selection of [isolated solutions](#).