

Design Consideration for Isolated Bias Supplies in Traction Inverters, On-Board Chargers, and DC/DC Converters

SPEAKERS



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SUMMARY

This tutorial will cover the design of low power isolated bias supplies used to power gate drivers in various systems like traction inverters, on-board charger, high voltage to low voltage DC/DC converters (auxiliary power modules), HVAC, and other systems. The emphasis of the talk will be on practical design steps, tradeoffs, and lessons learned from example designs. The tutorial will be divided into three parts.

ABSTRACT

This tutorial will cover the design of low power isolated bias supplies used to power gate drivers in various systems like traction inverters, on-board charger, high voltage to low voltage DC/DC converters (auxiliary power modules), HVAC, and other systems. The emphasis of the talk will be on practical design steps, tradeoffs, and lessons learned from example designs. The tutorial will be divided into three parts.

The first part will provide an overview of the typical architectures (centralized, semi-distributed, fully distributed), power requirements, and converter topologies used (flyback, pushpull, open loop LLC, integrated magnetic converters). The pros and cons of each approach will be explained.

The second part will go through a brief design example of an isolated bias supply. The key design parameters, component selection, and layout will be explained. Test results from a hardware prototype will show efficiency, output voltage regulation, thermal performance.

The third and final part will compare the EMI/EMC tradeoffs and impact of these isolated bias supply topologies. A side by side comparison of four topologies (flyback, pushpull, open loop LLC, and integrated magnetic) will be shown. The presentation will conclude with general recommendations and references for further learning.

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