

A New H(EV) Power Platform: Technologies for a COOLiR2™ Drive

COOLiR2™ Features:

- Versatile, scalable building blocks utilize proprietary Solderable Front Metal (SFM) process and wirebondless technology
- Die Free Package Resistance (DFPR) of typical 50uOhm
- Very low parasitic loop inductances
- Dual-sided cooling with low thermal resistance

COOLiR2™ Advantages:

- 175°C Tjmax rated semiconductors in conjunction with bondwireless assembly techniques enable highly reliable high deltaT system designs
- Enables utilization of standard, cost effective wafer processing lines as used for non-SFM devices
- Devices are fully tested, eliminating costly yield losses associated with multi die attach and wire bonding on expensive substrates
- Dual-sided cooling lowers thermal resistance Rth and improves Zth as required by applications



IR's COOLiR™ silicon and advanced COOLiR2™ packaging technology provides a new power management platform approach for H(EV) vehicles to help address the need to reduce the size, weight and system cost of electric power train components while increasing system reliability for long lifetime, low maintenance and low warranty cost.

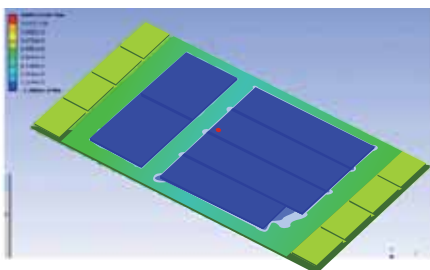
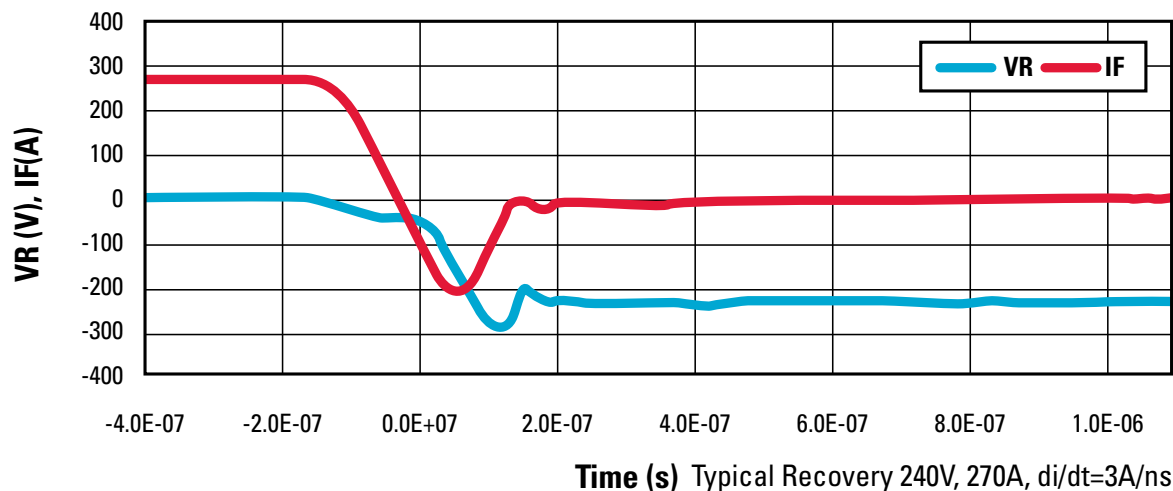
IR's new COOLiRIGBT™ and COOLiRDiode™ switches are manufactured on cost-efficient standard process and equipment technology to improve the performance and ruggedness of the devices without increasing manufacturing cost.

The portfolio features extended temperature range of 175°C and both slow and fast switching devices up to 200kHz for motor control and DC-DC applications respectively.

Fully utilizing the capabilities of its newest generation of 175°C power switches, IR's new COOLiR2DIE™ package provides a versatile, scalable building block featuring a proprietary Solderable Front Metal (SFM) process on ultra-thin die to minimize wafer warpage, enabling the utilization of the same standard, cost effective wafer processing lines used for non-SFM devices. The devices are fully tested, eliminating costly yield losses associated with multi die attach and wire bonding on expensive substrates.



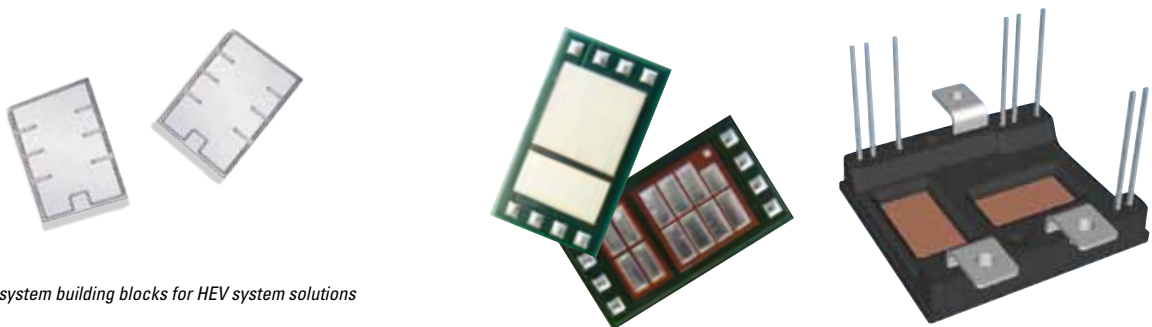
Exceptionally Smooth Reverse Recovery During Switching



FE Analysis of Die Free Package Resistance (DFPR)

The COOLiR²DIE™ package platform supports all of IR's SFM capable technologies including IGBT, MOSFET and diodes and scales to large die sizes also supporting multi-die attach outlines. Because of the solderable front metal, current spreading resistance present on die surfaces with wire bonds or clips is virtually eliminated, reducing losses and increasing die temperature uniformity. Wide copper tracks on the carrier allow for Die Free Package Resistance (DFPR) of typical 50uOhm. The package outline has been optimized to enable module layouts with very low parasitic loop inductances of 10-15uH utilizing common and proven assembly techniques.

When assembled on a substrate, the COOLiR²DIE™ provides an electrically isolated copper surface for top-side cooling to lower thermal resistance by 35 percent in real-world applications.



IR's automotive sub-system building blocks for HEV system solutions

IR's new automotive sub-system building blocks for HEV system solutions enables customers to develop highly scalable and form factor flexible custom (H)EV products. Ultrathin bare dice are mounted on a DBC Carrier (COOLiR²DIE™). Multiples can be combined into a half-bridge module, COOLiR²BRIDGE™ or multi-phase modules. The COOLiR²Drive™ is IR's reference design system for the entire COOLiR²™ module platform.