

High-Side Active ORing Devices Deliver Fast Response for Intermediate Bus Applications

Picor, a subsidiary of Vicor, has expanded its Cool-ORing product family with the introduction of two high-side active ORing devices aimed at 12-V and 48-V high-side redundant bus applications. Housed in a 3-mm x 3-mm TDFN, the PI2007 is a universal high-speed active ORing controller designed for use with n-channel MOSFETs. Building on the functionality of that chip, the PI2127 co-packages the '2007 controller with a 60-V MOSFET to provide a highly compact active ORing solution in a 7-mm x 8-mm LGA (Fig 1).

Distinguished by their fast response time, these devices address a broad range of ORing requirements in intermediate bus applications in high-availability systems such as servers, telecom, computing, and communications infrastructure equipment. Moreover, these high-side devices can be combined with the company's previously introduced low-side devices to create complete active ORing solutions for applications such as those meeting the PICMG 3.0 specification. Both the PI2007 and PI2127 feature an internal charge pump that eliminates the need for a separate bias supply for high-side applications.

The PI2007/PI2127 specify a reverse-current turn-off delay response time of just 80 ns (Fig. 2). According to Picor, it takes competitive active ORing products more than 300 ns before they recognize the failure and hundreds of nanoseconds more to disconnect the failed source. For such delay in terminating the failed source, a very high current ($\gg 100$ A) will build up, says the vendor. At the very least, this high current will disrupt the output load voltage and may cause permanent damage to the system.

The PI2007 controller is optimized for use in 12-V and 48-V high-side redundant power architectures, including systems that have a wide input-voltage range of 36 V to 75 V and are also required to operate during input voltage transients up to 100 V for 100 ms.

The PI2007 controls either single or paralleled MOSFETs to allow the flexibility of optimizing for different power levels. The PI2007 provides an active-low fault flag output to the system during reverse current, excessive forward overcurrent and UVLO fault conditions. The PI2007 will also perform a FET-check upon initial power-up of the system to determine whether or not the MOSFET is shorted. When paired with the PI2003, which is optimized for low-side operation, a complete high-side/low-side chip-set solution can be enabled for 48-V telecom applications (Fig. 3).

The PI2127 is a complete high-density, full-function Active ORing solution with an integrated high-speed ORing MOSFET controller and a 60-V, 85-m Ω MOSFET. This integrated solution minimizes the system board real estate required to achieve the ideal ORing diode function, while minimizing overall design complexity. Because of the co-packaged MOSFET, the PI2127 is suited for narrow-range high-side 48-V bus applications.

With its 8.5-m Ω internal MOSFET, the PI2127 provides very high efficiency and low power loss during steady-state operation, while also providing very fast turn-off of the internal MOSFET during input power source fault conditions that cause reverse current flow. The PI2127 is packaged in a thermally enhanced 7-mm x 8-mm land grid array capable of delivering up to 12 A over a wide range of operating temperatures. In discussing the space savings afforded by the PI2127, the company notes that this part's 7-mm x 8-mm footprint is the about the same size as some of the discrete MOSFETs (ex. TO-220s) that are currently being used in active ORing applications.

Other features include an active-low fault flag output to the system during reverse current, excessive forward overcurrent and UVLO fault conditions.

"Picor's Cool-ORing solutions can substantially reduce power dissipation by up to ten times versus conventional diode ORing solutions, eliminating the need for unnecessary thermal management overhead, while reducing board real estate by over 50% and achieving benchmark dynamic response versus conventional Active ORing solutions," says Carl Smith, director, strategic marketing and business development at Picor.

Available now, the PI2007 and PI2127 are unit priced at \$1.61 and \$4.66, respectively, in 1000-piece quantities. For data sheets and other information, please visit the [Picor Web site](#).



Fig 1. The PI2007 and PI2127 are high-side active ORing devices aimed at 12-V and 48-V high-side intermediate bus applications. The PI2007 is a universal high-speed active ORing controller designed for use with n-channel MOSFETs. The PI2127 co-packages the '2007 controller with a 60-V MOSFET to provide a highly compact active ORing solution. (Devices are shown on left, evaluation board on right.)

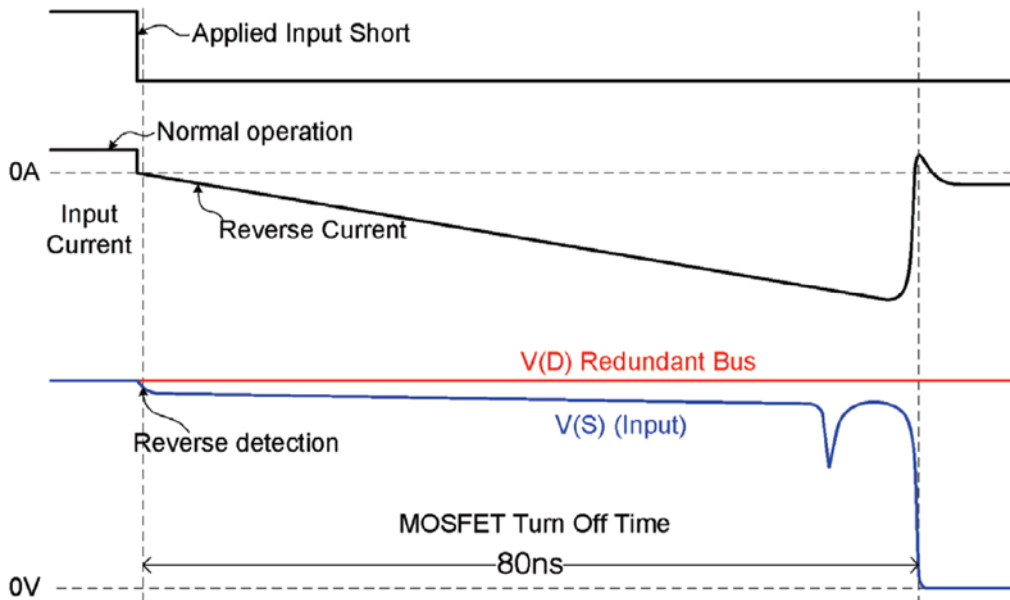


Fig. 2. The PI2007 controller enables a very low power loss solution with fast dynamic response to fault conditions. With its 80-ns reverse current turn-off delay time and 4-A gate peak discharge current capability, the controller can turn off the external MOSFET very quickly.

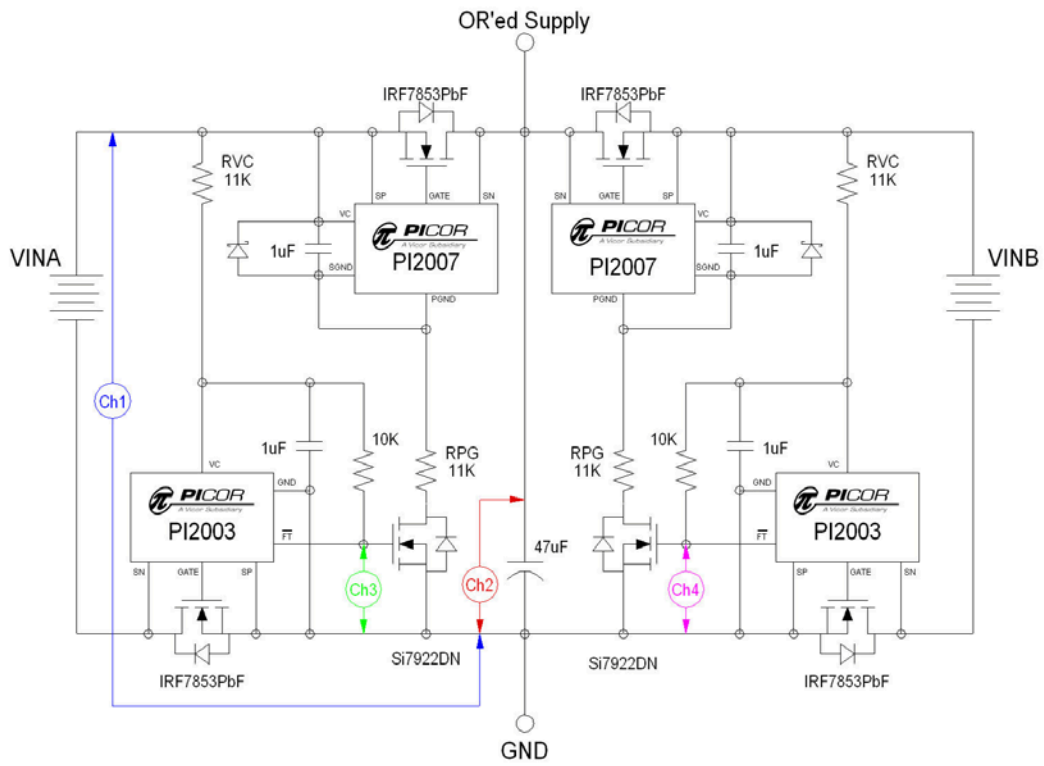


Fig. 3. For applications requiring active ORing on both high and low sides of the power path, the PI2007 high-side controller can be combined with the company's PI2003 low-side controller.