

## ***eFuses Deliver Precise I<sup>2</sup>t Wire Protection***

[Infineon Technologies'](#) PROFET Wire Guard provides developers with advanced wire protection for modern power distribution. Compared to conventional fuses, members of this product family can emulate the stress characteristics of the wires much more accurately with an integrated and precise I<sup>2</sup>t wire protection curve, which can be selected from six implemented curves depending on the application requirements. Combined with other features, the integrated I<sup>2</sup>t wire protection accuracy enables wire harness optimization when replacing mechanical relays and fuses (see Figs. 1 through 3).

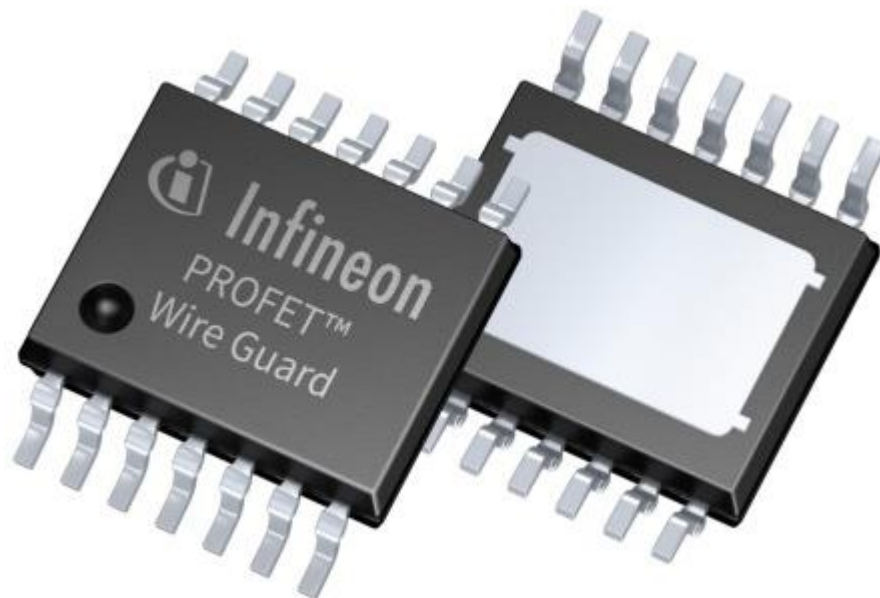
The five PROFET Wire Guard devices come in the proven TSDSO-14 and TSDSO-24 packages. They offer full pin-to-pin compatibility within the family and high compatibility with PROFET +2 12-V devices and are targeting currents of up to 27 A. To expand the current capabilities up to 36 A, the product line-up will be further extended with an additional device coming in Q4 2025.

The devices have a capacitive load switching (CLS) mode implemented to charge capacitive loads. An adjustable overcurrent detection threshold supports fast fault isolation from the power supply. The integrated automatic idle mode reduces current consumption during parking to typically 50  $\mu$ A, while the output stage remains fully switched on.

Built-in sequential diagnosis provides accurate application data across five addresses on a single pin, enabling application integrity testing for functional safety requirements and further wire harness optimization during facelifts based on the analysis of the wire protection status during vehicle operation. The devices have been developed and are released as ISO 26262:2018 Safety Element out of context for safety requirements up to ASIL D.

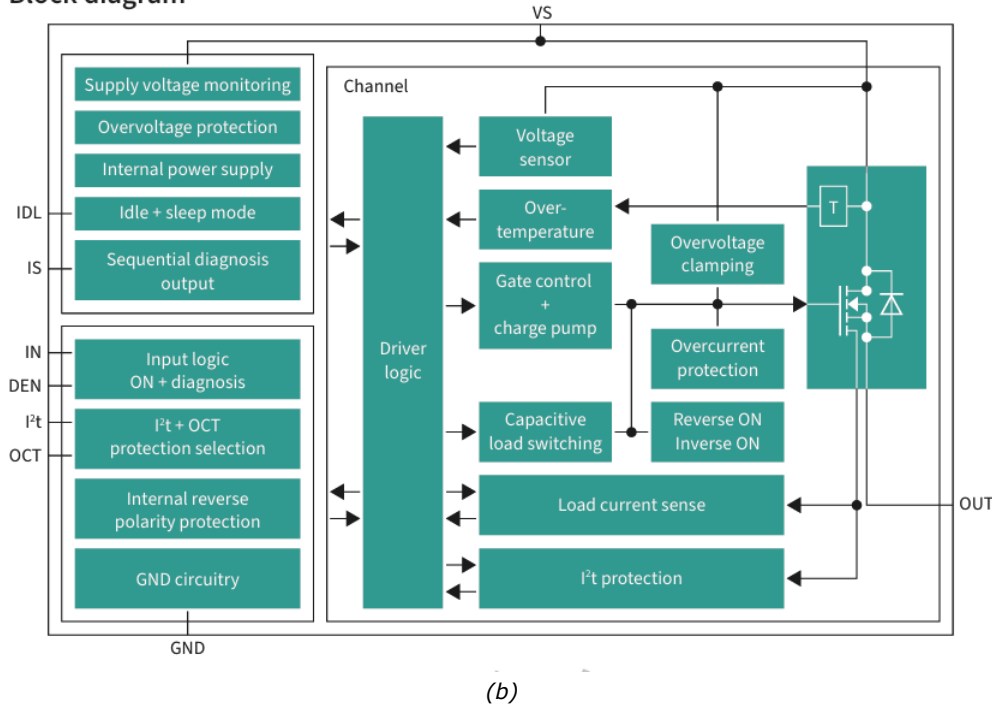
To support the design-in process, the product family is integrated into the Infineon Automotive Power Explorer, which is available in the Infineon Developer Center. This simulation tool supports, for example, the evaluation of the system protection capability of PROFET Wire Guard devices with a given wire and load profile. It also calculates the correct resistance values for the adjustable overcurrent detection threshold as well as the selection of the integrated I<sup>2</sup>t wire protection curves. Additionally, the tool can calculate parameters like  $k_{LIS}$  accuracy or power dissipation for the whole product family.

The PROFET Wire Guard 12-V family is available now. For more information, see the [PROFET Wire Guard 12 V page](#). Also see the [Infineon Automotive Power Explorer](#) and [Infineon Developer Center](#) pages.

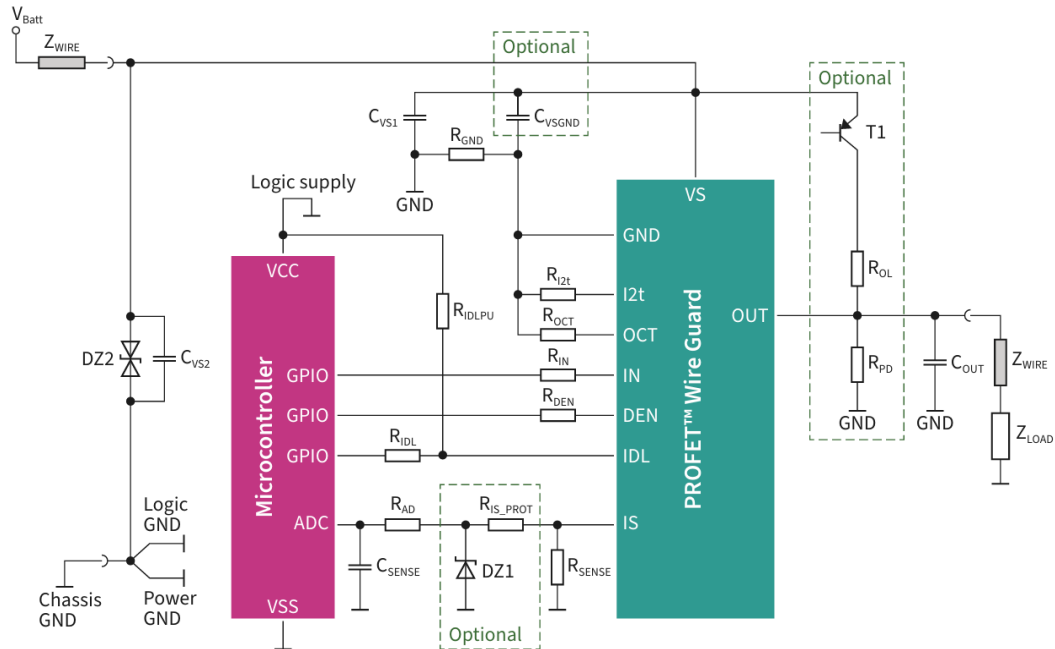


(a)

**Block diagram**



*Fig. 1. An alternative to conventional fuses and relays, PROFET Wire Guard 12-V is an automotive smart high-side switch that provides advanced wire protection with an integrated and precise I<sup>2</sup>t wire protection curve, enabling wire harness optimization. It features adjustable overcurrent threshold for fast failure isolation and less than 60- $\mu$ A current consumption during parking. A package photo (a) and block diagram (b) are shown here.*



*Fig. 2. Application diagram. The PROFET Wire Guard actively monitors the wire stress and reports the wire condition to the microcontroller. It will switch off automatically when a predefined critical threshold is reached, using one of six selectable I<sup>2</sup>t protection curves (see Fig. 3). These curves emulate the wire characteristic and therefore enable precise wire protection. Further, PROFET Wire Guard provides the wire protection status even beyond a protective switch off and can be re-activated once the wire temperature has decreased.*

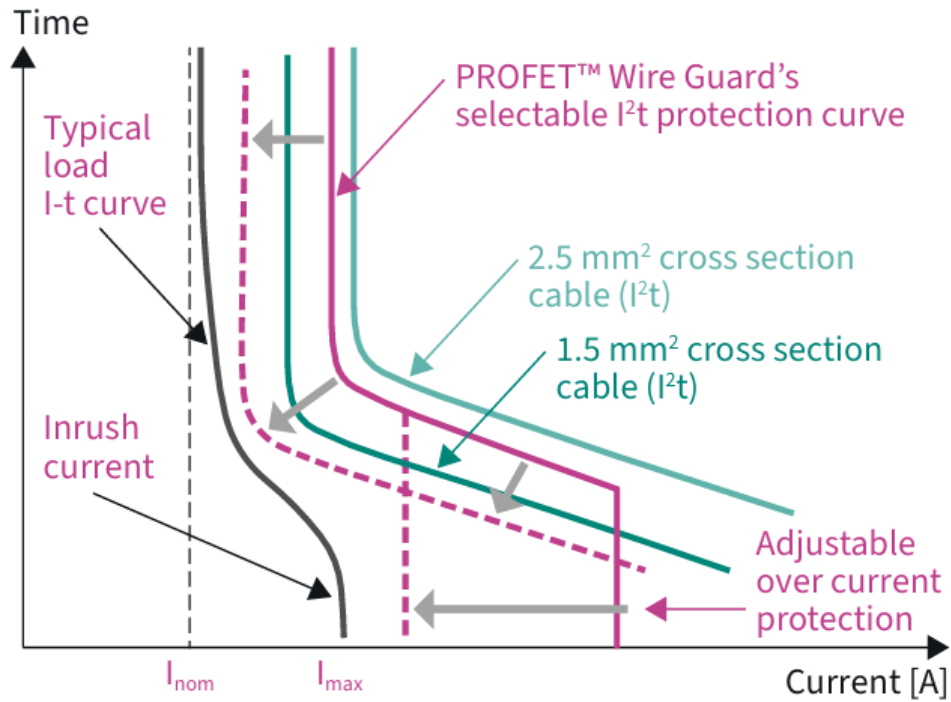


Fig. 3. The PROFET Wire Guard provides six accurate integrated  $I^2t$  wire protection profiles combined with fast failure isolation.