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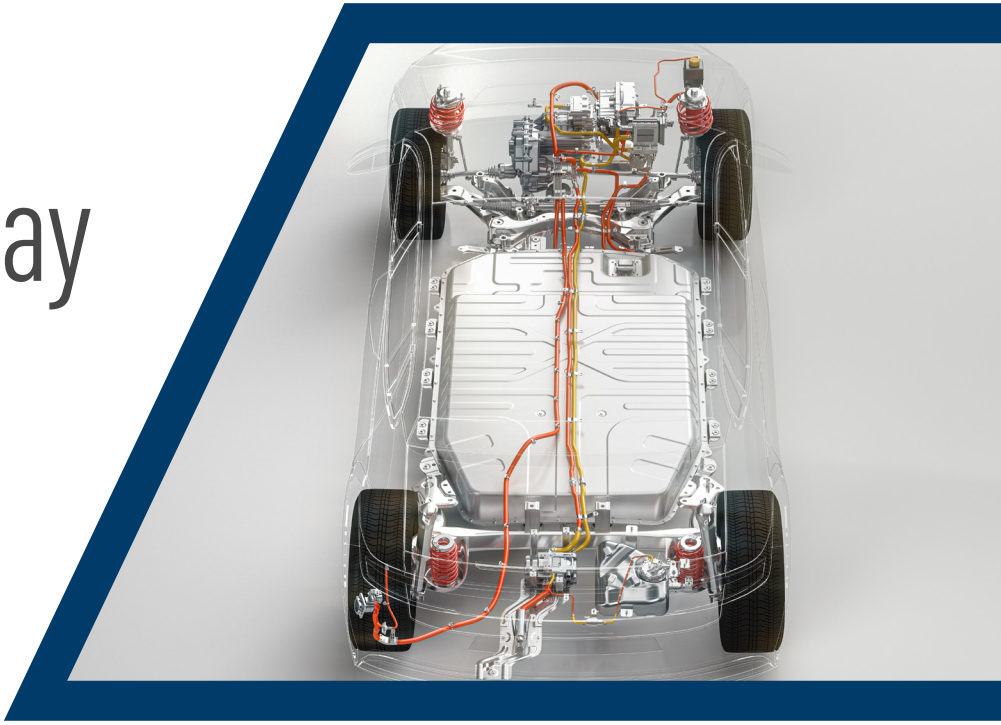
Application Note
PhotoMOS® Automotive Relay

When it comes to passenger safety in xEV cars, PhotoMOS® relays are a leading part for battery isolation monitoring. The fast electronic MOSFET relays can be used for leakage current detection between the car chassis and the HV battery.



Isolation monitoring

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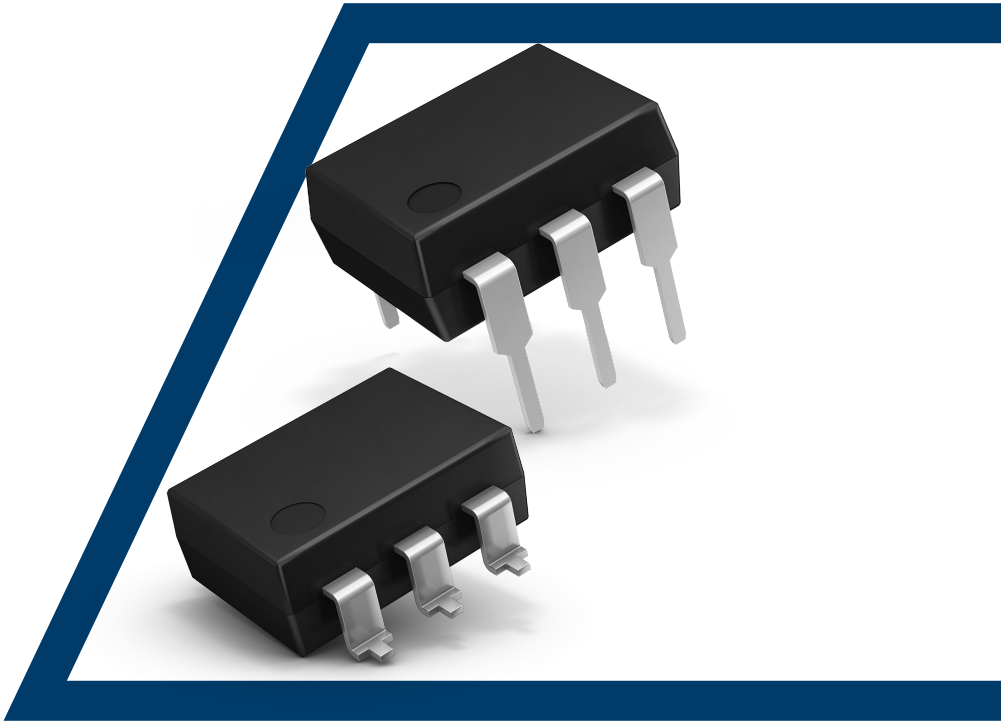
PRODUCT

Automotive MOSFET relays // PhotoMOS® AQW216HAX, AQV219HAX, AQV258HAX



PURPOSE

High reliability switching within harsh automotive operational conditions

Electric vehicles operate with high-voltage 450 VDC or up to 1000 VDC where a safe separation of low voltage (chassis) and high voltage (power train) is needed

FEATURES

Special lead frame: DIP5 package to meet clearance and creepage requirements
Double molding
Accordance to AEC-Q101
Ambient temperature range: –40°C to +105°C.

Isolation monitoring

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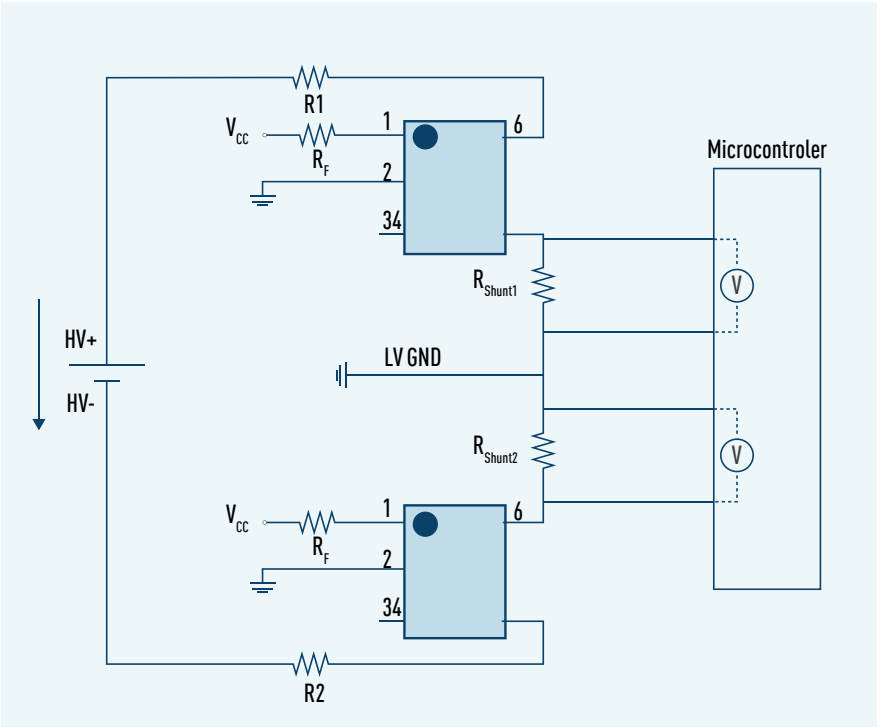
FACTS & FIGURES

The most common application for MOSFET relays in the automotive sector is isolation monitoring. Target of this application is to check the secure separation between HV+ and chassis as well as HV- and chassis. To do so, two monitoring paths are necessary:

In connection with a highohmic resistor chain (R1 and R2), a PhotoMOS® and a shunt resistor (RShunt1 and RShunt2) the secure separation of the high-voltage and low-voltage sides of the electrical system is checked.
Range: –40°C to +105°C.

Both paths are switched alternating, means if PhotoMOS® of HV+ path is closed, PhotoMOS® of HV- path is open and vice versa. Means in normal operation mode, no current will flow due to an always open circuit.



Isolation monitoring

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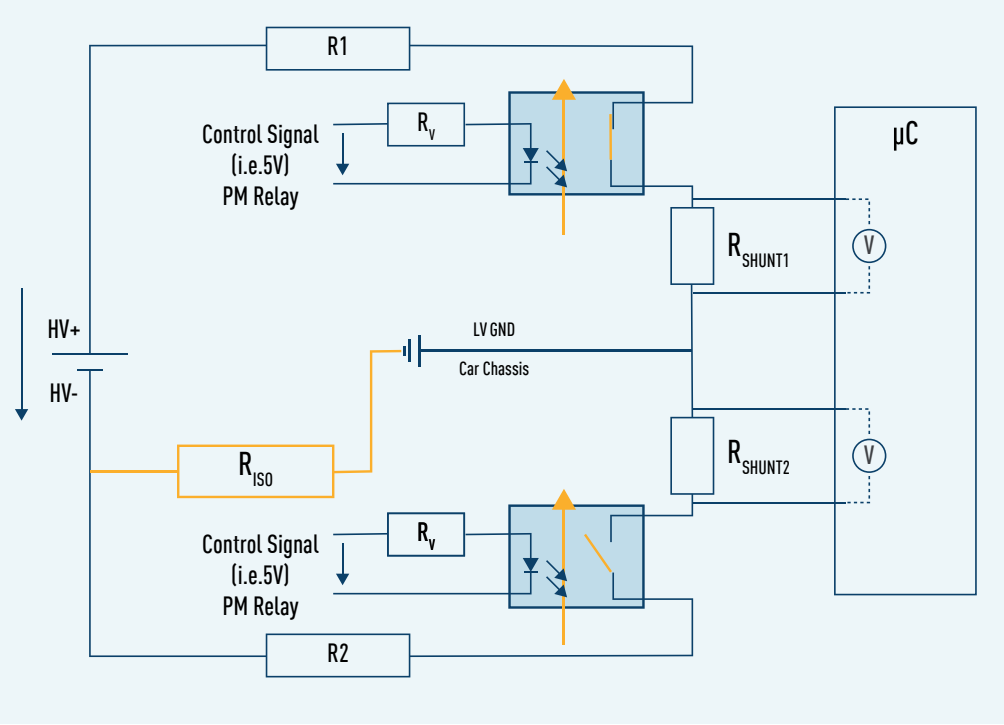
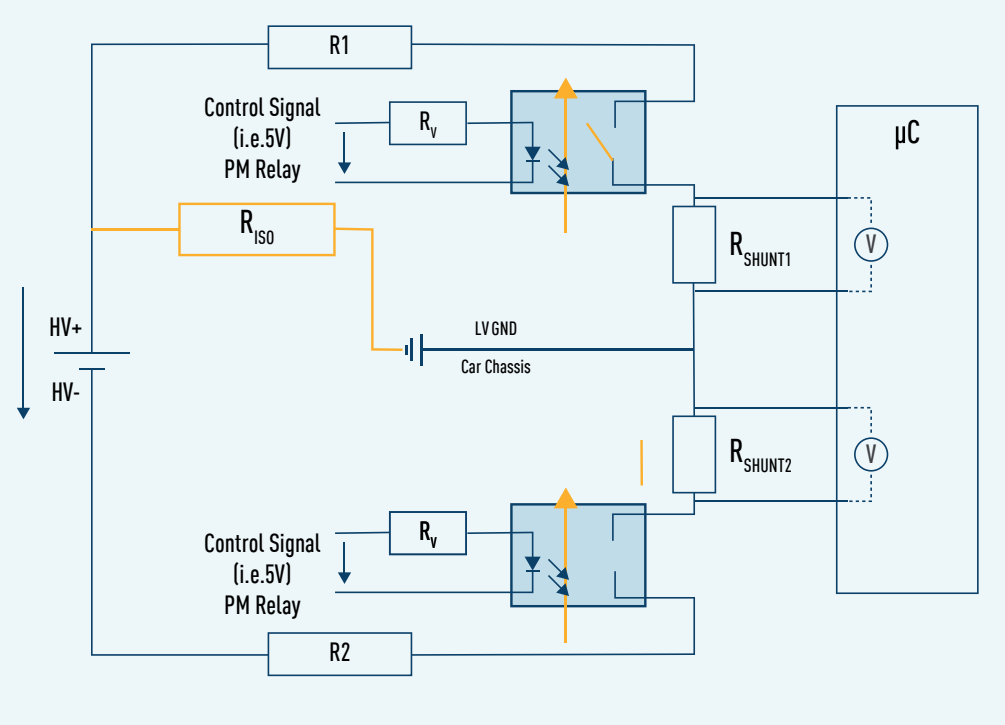
FACTS & FIGURES

In case of an isolation failure in the system there is a certain resistance (Riso), means a more or less conductive connection between Chassis and HV+ and/or HV-. If the test is performed now, means a PhotoMOS® is closed there is a closed circuit between HV+ and HV- and thus, there is a certain current flow in the corresponding path. Due to that current through the Shunt resistor (RShunt1 and/or RShunt2) a respective voltage drop is detected by the control electronics and as a result a cutoff function for the traction battery is activated.





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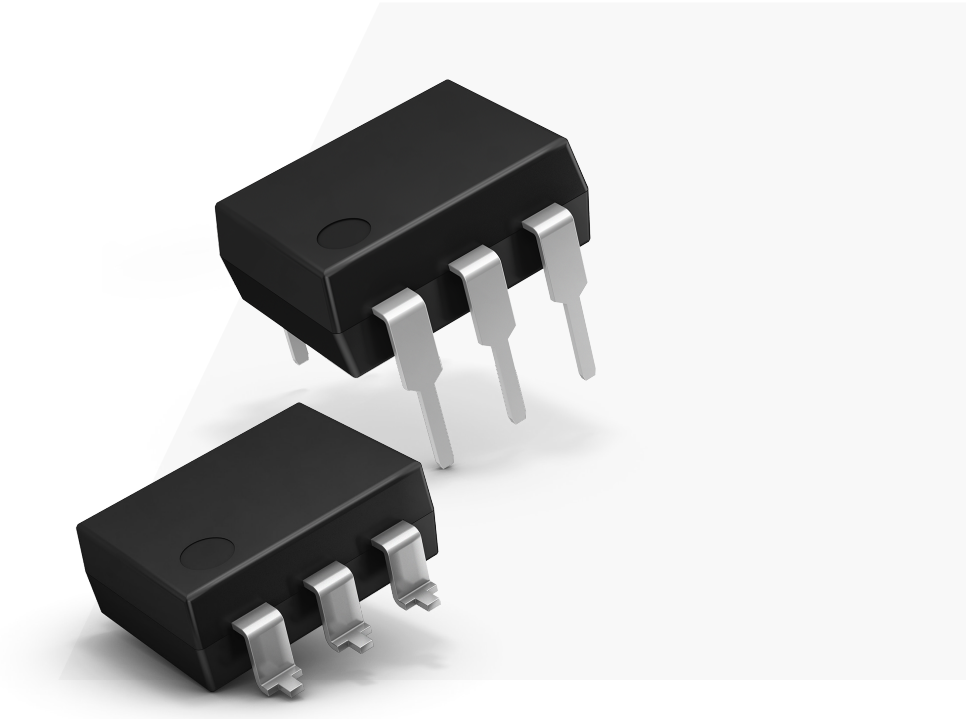

Application Note - How to solve various tasks with PhotoMOS® Automotive Relays
Date: May 2021
Contact: Panasonic Industry Europe GmbH, info@eu.panasonic.com