

# AUTOMOTIVE CIRCUIT PROTECTION SOLUTIONS



Circuit protection  
solutions from  
the technology leader



The Protection You Need For The Road Ahead.





Littelfuse develops

innovative technologies

that protect automotive electrical circuits  
from overheating and overvoltage.

We help turn dreams and aspirations into  
reliable transportation.

# Automobile Circuit Protection

## *More Electronics, More Vulnerabilities*



Today's automobiles include more electronic systems than ever before. Over their lifetime these systems are exposed to a wide range of potential overcurrent and transient voltage hazards. Overheating of actuators, traces and wire harnesses plus transients caused by load dump, mutual coupling, ignition pulse, ESD, noise... these are just a few of the issues system designers must contend with.

### **More Applications.**

Innovations in safety and environmental systems, as well as driver expectations of greater comfort, convenience and security are all driving the trend toward more sophisticated on-board electronic applications. Many of these systems are critical to vehicle performance and passenger safety and require robust protection against electrical threats.

### **Evolving Technologies.**

The new 42V PowerNet poses new circuit protection challenges as the demand for more electrical power in vehicles increases beyond the capacity of today's conventional 14V systems. Gas/electric hybrids and emerging fuel cell technologies are also completely changing the requirements for wiring and power distribution protection solutions.

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# Circuit Protection Solutions for Automotive Applications

## 1 Powertrain



ENGINE MANAGEMENT  
TRANSMISSION CONTROL  
COOLING FAN  
WATER PUMP

- Module load dump suppression
- Reverse battery protection
- Actuator's switching transient suppression
- Actuator's overcurrent protection

- PTCs—SMD, Radial Lead 30R and 60R
- MOVs—ZA series
- MLVs—AUML series
- TVS-Diodes—SMBJ, SA, 5KP, SLD series

## 2 Safety



ABS, EPS  
AIR BAG  
CHASSIS CONTROL

- Module load dump suppression
- Reverse battery protection
- Actuator's switching transient suppression
- Actuator's overcurrent protection

- PTCs—Radial Lead 30R and 60R
- MOVs—ZA series
- MLVs—AUML series
- TVS-Diodes—SMBJ, SA, 5KP, SLD series

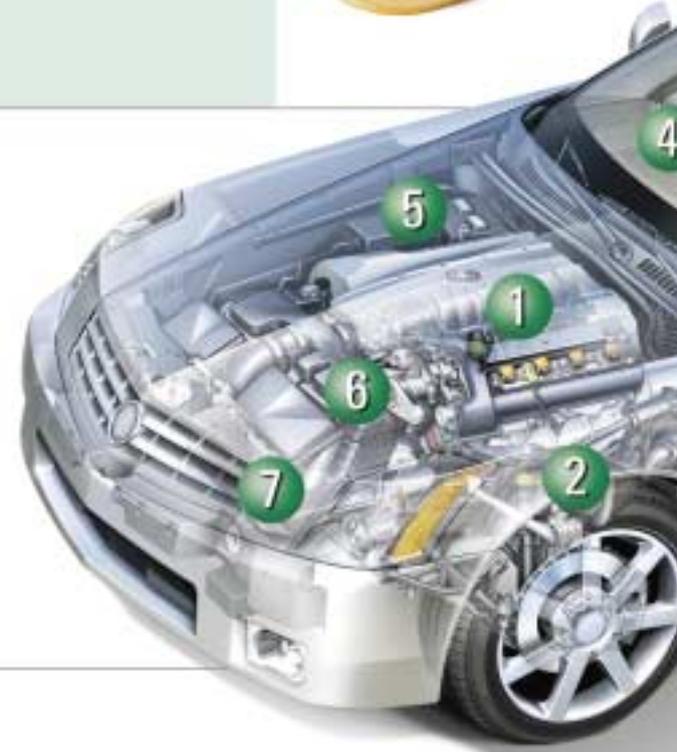
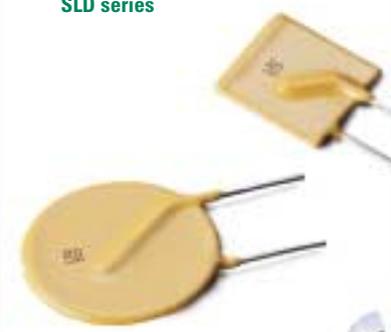
## 3 Comfort



WINDOW LIFT  
SUN ROOF  
DOOR LOCK  
POWER SEAT  
HVAC

- Module load dump suppression
- Reverse battery protection
- Actuator's switching transient suppression
- Actuator's overcurrent protection
- ESD protection

- PTCs—Radial Lead 30R and 60R
- MOVs, ZA series
- MLVs—AUML, MLA, MLE series
- TVS-Diodes—SMBJ, SA, 5KP, SLD series



#### 4 Infotainment

#### 5 Fuse Box

#### 6 Power Supply

#### 7 Lighting



DASHBOARD  
NAVIGATION  
IN-CAR ENTERTAINMENT

- Module load dump suppression
- Short cut protection
- ESD protection

- Electronic Fuses—SlimLine Lead-Free
- PTCs—1206L, 1812L, 3425L series
- MLVs—AUML, MLA, MLE, MHS series
- TVS-Diode Arrays—SP72X series
- PulseGuard®—PGB1 series
- Gas Discharge Tubes—SL0902 Series

WIRE HARNESS

- Overcurrent protection

- Low Profile Fuses—JCASE® and MINI® Fuses
- Bolt Down Fuses—MIDI® and MEGA® Fuses
- Cartridge Fuses—JCASE® and JCASE® 42V Fuses
- Inline Protector—CABLEPRO® Protector
- Electrical Vehicle—EV Series
- Blade Fuses—ATO®, MINI®, MAXI®, 42V MINI®, and 42V MAXI® fuses
- PTCs—Radial Lead 30R and 60R

GENERATOR  
POWER-GENERATOR

- Central load dump suppression

- TVS Diodes
- TVS Thyristors

HID HEADLIGHT  
HEADLIGHT LEVELING  
DIRECTIONAL LIGHTING

- HID ignition
- Module load dump suppression
- Reverse battery protection
- Actuator's overcurrent protection

- Gas Discharge Tubes—XT, VS, LT series
- PTCs—Radial Lead 30R and 60R series
- MOVs—ZA series
- MLVs—AUML series
- TVS-Diodes—SMBJ, SA, 5KP, SLD series





### **Reduced Cost.**

The need to reduce vehicle cost and strict space and weight requirements have also helped drive the evolution toward electronic control of traditional mechanical loads.

### **Continued Reliability.**

Even in the face of increased complexity and vulnerability, automobiles must continue to meet consumer expectations for reliability. Protecting the silicon chips and other sensitive electronics within automotive modules, as well as the power distribution and wiring harnesses that feed these modules, is critical to a vehicle's success.

### **The Littelfuse Solution.**

Littelfuse can offer a complete range of circuit protection solutions for automotive applications. Our experience and dedication to the automotive business ensures the best possible protection for your electronic systems.

Littelfuse helps you protect these systems from failure, reducing warranty repairs and recalls, while increasing customer satisfaction.



# Littelfuse-The Leader In Automotive Circuit Protection



Circuit protection solutions from the technology leader

To ensure safety from overload or fault currents, nine out of ten cars in the world rely on Littelfuse designed products for protection of electrical circuits and wiring.

We serve major automakers, wiring harness manufacturers and automotive parts suppliers /mass merchandisers worldwide. We provide components and application assistance to circuit designers for transient suppressor selection for use in everything from ABS, airbag/ seat position to drive train, Electronic Engine Control and body control modules.

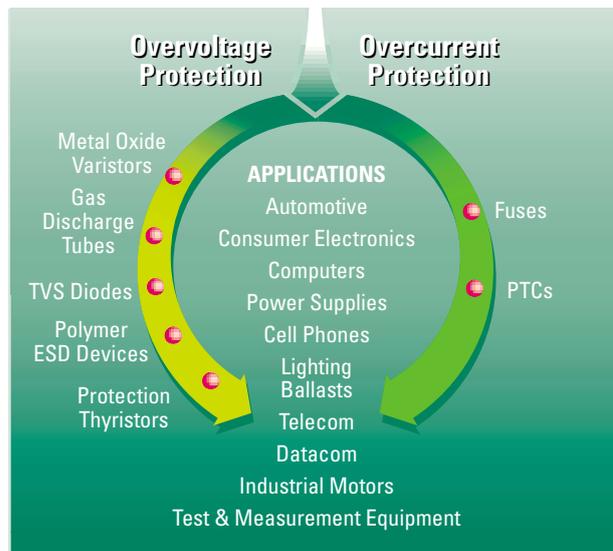
Littelfuse has been a leader in automotive circuit protection for over 50 years. We offer overcurrent and overvoltage protection for every electrical system in the vehicle—from low energy to high energy—and for every application, from comfort and safety to telematics and infotainment.

Our global distribution network, unequalled technical capabilities, strategically located operations, and reputation for quality make us the ideal partner and supplier for all of your automotive circuit protection needs.

## Innovative Solutions Designed to Your Specifications.

Littelfuse offers a wide range of protection technologies to automotive circuit designers for solving today's and future circuit protection requirements. Our focus on solutions, rather than just products, enables us to tailor our product offering to meet the needs of your specific application.

As part of this process, we make it our job to understand your applications and challenges. Because we can offer the broadest array of technologies—and work with you to design solutions to meet your specific needs—we can give you the best, most objective solution available. We are prepared to be a valuable resource and integrated partner in even your most complex circuit design efforts.



**Where You Need Us,  
When You Need Us.**

Littelfuse has consistently expanded its global customer base by directing our development and manufacturing efforts toward the entire circuit protection market, resulting in the industry's widest range of overvoltage and overcurrent solutions.

With manufacturing, development, sales and distribution centers around the globe, we can serve you where and when you need us.

To get additional technical information or samples, visit us at **[www.littelfuse.com](http://www.littelfuse.com)** or contact your local Littelfuse representative or sales office.

[www.littelfuse.com](http://www.littelfuse.com)



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