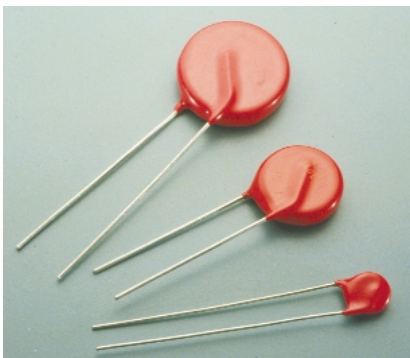


## Leading Voltage Suppression Technology

### Littelfuse acquires entire line of transient voltage suppression devices

As part of Littelfuse's commitment to provide the most comprehensive line of automotive circuit protection available, Littelfuse acquired Harris Suppression Products last year. Now the broad line of Harris transient voltage suppression devices – including multilayer varistor and silicon-based protection technology platforms – is a central focus of Littelfuse's circuit protection offering for automotive electronics applications.

In the automotive industry, transient protection is never optional. Automotive systems face a variety of hazards, including alternator-induced load dump transients, inductive load-switched transients and electrostatic discharge. The engine control module, ABS, restraint devices, powertrain modules, body control modules, instrument cluster and audio systems must all be protected from transient voltage hazards.



Littelfuse MOVs

Littelfuse Suppression Products (formerly Harris), the leader in transient suppression devices for automotive systems, offers two basic technologies ideal for automotive systems design – Metal Oxide Varistors (MOVs) and Multilayer Suppressors available in a variety of proven package options and form factors.

#### Through-Hole Leaded MOVs

MOVs are the front line of defense against transient voltage threats, designed to absorb levels of energy pulses that could otherwise damage or disable components or systems. MOVs are ceramic poly-crystalline structures constituting a three-dimensional network of semiconducting P-N junctions which allow transient energy to be dissipated uniformly through the device. No other single technology can match the Littelfuse MOV's energy absorption, range of operation and cost-effectiveness. Widely used for a variety of applications including automotive load dump, MOVs are available as epoxy-coated or high temperature phenolic coated Radial MOVs – both in 7, 10, 14 and 20mm sizes – and low-profile "boxed" leaded MOVs for high temperature and severe vibration applications.

#### Surface Mount Suppressors

Multilayer suppressors are the preferred choice for surface mount automotive applications, due to superior energy density handling capability, resulting in extremely small package sizes from 0603 to 2220.

Harris Suppression has a history of pioneering protection technology for the automotive industry, including the first MOV in high volume automotive applications; the first surface mount varistor; and the first automotive Multilayer Suppressor. Littelfuse will continue Harris' tradition of innovations with upcoming technology to save board space and stop transients before they enter the module. For products engineered to meet the automotive industry demands for reliability, performance and value, OEMs can rely on Littelfuse Suppression for all their transient voltage suppression needs.

**CONVERGENCE 2000**  
INTERNATIONAL CONGRESS ON TRANSPORTATION ELECTRONICS

#### Delivering on Technology's Promise at Convergence 2000

Littelfuse booth #1181  
Convergence 2000  
October 16 - 18  
Cobo Center  
Detroit, Michigan

Convergence is the premier automotive electronics conference in the world, and Littelfuse is living up to this year's Convergence 2000 theme – Automotive Electronics: Delivering Technology's Promise – with overcurrent suppression devices, surface mount fuses, prototype 42V fuses, and a variety of state-of-the-art circuit protection devices designed for electronics applications.

## Delivering Technology's Promise

How will the automotive industry deliver a vehicle that is safer, wireless, affordable, environmentally friendly and profitable? These are the questions Convergence 2000 will need to address as part of the theme "Automotive Electronics: Delivering Technology's Promise". At Littelfuse, we face these questions every day and we take them very seriously because it is our responsibility to drive the evolution of circuit protection to support changing automotive designs.

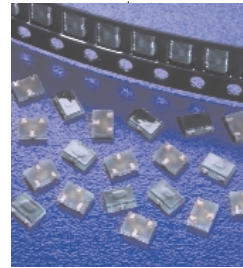
Littelfuse is committed to helping the automotive industry deliver on technology's promise by providing circuit protection innovation leadership. Not only did Littelfuse invent and manufacture almost every automotive fuse in OEM vehicles that come off the line today, but we also lead innovation in circuit protection devices for automotive electronics, with such devices as Metal Oxide Varistors and PulseGuard Suppressors for overcurrent suppression, resettable PTCs, and the 0603, the world's smallest surface mount fuse. In addition, Littelfuse has developed breakthrough automotive technologies for protection of high current circuits and high voltage systems.

Littelfuse is the only company in the world that offers a full line of automotive and electronics devices for every conceivable circuit protection need on an automobile. With world-class QS-9000 certified engineering and manufacturing operations, unrivaled quality assurance, and on-time delivery across the globe, Littelfuse can be your sole source for circuit protection – and together we will unleash the potential of technology for the automotive industry.

Mike Sammons  
General Manager  
Littelfuse Automotive Division

# Covering Automotive Electronics with High Tech Circuit Protection Devices

"Electronics are changing everything," said Trevor Jones, founder of the Convergence conference. Today, electronics impact almost every aspect of automotive design, and the circuits for electronics applications need protection just like any other automotive application. Littelfuse offers a full line of technologically advanced electronics fuses designed for automotive applications, as part of the most comprehensive automotive circuit protection offering on the market today.

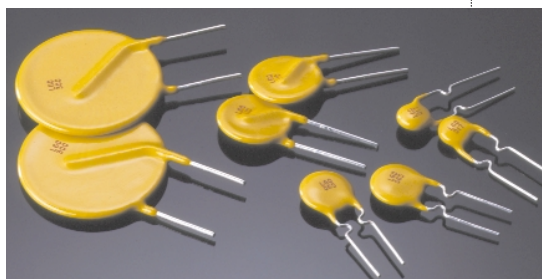


PulseGuard Suppressors

"Littelfuse has been exploring new methods of circuit protection and acquiring new product lines so that we can maintain our position as the ultimate automotive circuit protection provider," explained Don Tidey, Senior Field Applications Engineer. "As electronics become more prevalent in automotive designs, Littelfuse has a variety of devices to cover the increasing range of automotive circuit protection needs."

## MOVs for over-voltage protection

Metal Oxide Varistors (MOVs), provided by Littelfuse Suppression Products, are the front line of defense against transient voltage threats, designed to absorb levels of energy pulses that can damage or disable automotive components or systems. For more about MOVs see the front page of this issue of *SOLUTIONS*.



PTC Resettable Devices

## PulseGuard® Suppressors for ESD protection

Littelfuse's new PulseGuard® Suppressor product line, also part of Littelfuse Suppression Products, provides an option for

protection against electrostatic discharge (ESD) overvoltage events. PulseGuard suppressors are designed for use on automotive diagnostic system data lines or any communication line that connects integrated circuitry to the outside world, exposing the system to ESD events. Available

in the EIA SOCM-1608 (0.063" x 0.031") package for a single line of protection, PulseGuard suppressors will soon be available in JEDEC standard configurations for multiple lines of protection and connector arrays.

## PTC devices for resettable protection

Littelfuse is the only circuit protection manufacturer to offer PTC devices as part of a complete line of fuses for automotive applications. PTC products are an integral part of Littelfuse's line of circuit protection products because they have the unique capability to reset themselves once the fault or overcurrent condition has cleared.

Littelfuse resettable devices utilize a unique polymer-based PTC material to protect electrical circuits against overcurrent conditions. PTC stands for "positive temperature coefficient" which means that the material's

resistance to electrical currents increases when temperature increases. The PTC device will break the current and reset itself as many times as needed. This revolutionary technology offers great potential for the future of circuit protection in automotive electronics.



# Quest for Excellence

## Littelfuse Named Automotive Industry's Best Electrical Component Supplier

Littelfuse has been voted as "Best Electrical Component Supplier" for the second consecutive year by readers of *Automotive Industries* magazine in the Quest for Excellence 2000 survey. In the electrical components category, Littelfuse received the highest ranking and was the only fuse manufacturer to be recognized as a top supplier.

Suppliers were rated on quality, price, delivery, service and innovation by automotive OEMs as part of the publication's annual survey, with results published in the July 2000 issue.

"Excellence is the foundation on which all top supplier companies are built," said Andrew Cummins, Editorial Director for *Automotive Industries*. "Suppliers who consistently rank high in the five areas of quality, price, delivery, service/response and innovation deserve to be ranked among the best of

the best and receive the coveted Quest for Excellence award."

"This award reflects the dedicated efforts of the entire Littelfuse automotive team," said Mike Sammons, General Manager for Littelfuse Automotive, "supporting our customers across the board with product and service quality, competitive pricing and on-time delivery, as well as leading the circuit protection industry with technological innovations."



Littelfuse's (from left) Scott Hawkinson, Mike Sammons and Jim Plastow receive the "Best Electrical Component Supplier" award at the Quest for Excellence awards dinner.

### Industry leading surface mount fuses

Littelfuse is the industry leader in surface mount fuses for electronics, providing high performance in compact, efficient packages. The following are a few of Littelfuse's most popular SMF innovations, ideal for automotive applications.



The 0603 SMF

**The 0603 Very Fast-Acting Thin Film Surface Mount Fuse** is the world's smallest fuse, providing high power density while saving valuable board space. Now available in current ratings from 1/4 to 5 amperes at 32 volts, the 0603 measures only .063 inches long x .031 inches wide x .018 inches high, and incorporates high reliability thin film processing techniques that ensure consistent performance in this sub-miniature package. Offering lower resistance for power savings, faster opening times for a higher degree of protection and a lower profile for space critical applications, the 0603

packs more safe power handling capability per fractional cubic inch than any other surface mount fuse.

**ALF II SMF** is a very fast-acting surface mount fuse in the 1206 chip size which incorporates thin film processing techniques for a low-profile design.

**1206 SMF Slo-Blo** offers an ALF II size with a time delay feature to eliminate nuisance opening by accommodating inrush currents that would cause a fast-acting fuse to open. The 1206 Slo-Blo is the smallest time-delay surface mount fuse available.



## WORLDWIDE NEWS

■ **Expanding electronics business drives record Littelfuse growth.** "Our strong electronics business continues to drive the overall performance of the company. Broad-based demand for electronic products, especially for communications and wireless applications, is generating record sales and earnings performance for Littelfuse," said Howard Witt, Chairman, President and CEO. For the second quarter of 2000, Littelfuse worldwide sales of electronic products increased 73%. "Looking ahead, we continue to see strong electronic demand through the end of this year and into 2001," Witt added. "As part of our ongoing commitment to new product development, we are working on new surface mount circuit protection products that we anticipate will enhance sales growth in 2001."

■ **Littelfuse introduces efficient new packaging for automotive aftermarket products.** The leading innovator in automotive circuit protection has developed new compact packaging for its entire line of aftermarket products, enabling retailers to fit 36% more product into the same planogram space. Color-coded, tri-lingual packaging permits use in the US, Canada and Mexico, and features prominent amperages for easy identification.

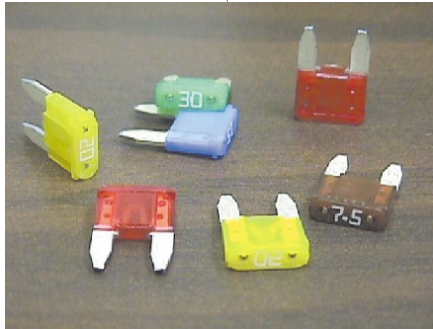
# Making the High Voltage Connection

## Littelfuse advances development of 42V fuses

According to the sponsors of the Convergence 2000 conference, "42-Volts is a near-term electronics architecture necessary to power today's and future mobile electronics." A variety of high voltage power options will be reviewed at this year's conference, including Littelfuse's latest 42V fuse designs, built to handle very high voltages while offering proven Littelfuse performance.

The first product to be introduced as part of Littelfuse's high voltage line is the MINI42®, a high voltage version of Littelfuse's 14-volt MINI Fuse, the most popular automotive fuse in the world. Responding to customer demands, Littelfuse has engineered the MINI42 as a drop-in replacement for the current MINI Fuse. Available in ratings from 2 to 30 Amps, the MINI42 has the same blade spacing and dimensions as the MINI, with the addition of a rejection feature for added safety.

The rejection feature is key to the safety of the MINI42 and all Littelfuse high voltage devices. While Littelfuse high voltage fuses are designed to protect 42V and 14V systems against over-currents, placement of a 14-volt blade fuse into a 42V electrical system would be very hazardous. Littelfuse has minimized the risk, however, by designing a MINI slot in the fuse block that will only fit the unique housing of the MINI42. This is accomplished by removing the ribs on the corners of the MINI42 housing. The ribs on the original MINI housing make it impossible to fit in the new 42V slot. With this innovation, Littelfuse has been able to provide a high voltage MINI fuse while maintaining the compact MINI profile and the MINI Fuse's excellent performance.



MINI42 High Voltage Fuse

Also in development, the JCASE42 cartridge fuse will be available in ratings from 20A to 60A for protection of medium current circuits. It will be a modified version of the Littelfuse JCASE, a high current, time delay fuse. JCASE42 will have the same blade spacing and dimensions as the 32V JCASE, with an added rejection feature.

For high current applications in the 42V system, Littelfuse is testing high voltage versions of the MAXI Fuse; MIDI and MEGA Fuses with solid

bolt-down connections; and the CablePro.

Littelfuse is currently working with steering committees of industry groups – such as the MIT Consortium on Advanced Automotive Electrical and Electronic Components and Systems and SICAN – that are developing specifications and standards for the 42V system. Although standards for components have yet to be finalized, Littelfuse's latest high voltage designs meet all current 14V specs and expected high voltage electrical specifications. Littelfuse is also working with automotive OEM customers to develop circuit protection devices to be used in prototype vehicles with high voltage electrical systems.

"At Littelfuse, we believe in the merits of the 42-Volt system; we have fully supported the efforts of the automotive industry in the development of this new technology; and we expect it to become a reality in the near future," said Scott Hawkinson, Littelfuse Marketing Engineer. "The Littelfuse automotive team has been listening to our customers carefully, and we have been redesigning our high voltage fuse line according to their needs. When the new system becomes standardized, Littelfuse will be prepared to offer tested technology necessary to ensure its success."



a publication of



Littelfuse, Inc.  
800 E. Northwest Highway  
Des Plaines, IL 60016  
Phone: 847-824-1188  
Fax: 847-803-5364  
Website: [www.littelfuse.com](http://www.littelfuse.com)

Editor:  
Mike Sammons  
General Manager  
Automotive Division

E-Mail: [msammons@littelfuse.com](mailto:msammons@littelfuse.com)

#### Worldwide Locations

##### Detroit

Littelfuse, Inc.  
29240 Buckingham, Suite 11  
Livonia, MI 48154  
Phone: 734-458-3929  
Fax: 734-458-5051

##### Netherlands

Littelfuse, B.V.  
P.O. Box 2023  
3500 GA Utrecht  
The Netherlands  
Phone: (31) 30-2999900  
Fax: (31) 30-2999800  
E-Mail: [littelfuse@littelfuse.nl](mailto:littelfuse@littelfuse.nl)

##### England

Littelfuse UK, Ltd.  
3 Rutherford Road  
Stephenson Industrial Estate  
Washington, Tyne & Wear  
England NE37 3HX  
Phone: (44) 191-415-8181  
Fax: (44) 191-415-8189

##### Singapore

Littelfuse Far East Pte. Ltd.  
140 Paya Lebar Road  
#08-01/04 A-Z Building  
Singapore 409015  
Phone: (65) 746-9666  
Fax: (65) 742-8178

##### Hong Kong

Littelfuse HK Ltd.  
Unit 11-15, 25F  
Metro Center II  
21 Lam Hing Street  
Kowloon Bay, Kowloon  
Phone: (852) 28105099  
Fax: (852) 28105500

##### Korea

Littelfuse Triad, Inc.  
277-105 2KA  
Sung Soo-Dong  
Seoul, 133-123, Korea  
Phone: (82) 2463-6073  
Fax: (82) 2463-1777

##### Japan

Littelfuse, KK  
Kaneko Daini Building 12 F  
2-6-23 Shinyokohama Kohoku-Ku  
Yokohama 222-0033  
Phone: (81) 45-478-1088  
Fax: (81) 45-478-1089

##### Brazil

Littelfuse do Brasil  
Rua Irapuru N 54-A  
Moinho Velho  
Freguesia Do O  
Sao Paulo Cep 02960070  
Phone: (55) 11877-0909  
Fax: (55) 11876-6690