Littelfuse®

Expertise Applied | Answers Delivered

# Littelfuse SiC Product Catalog

CONVERT. CONTROL. PROTECT: A COMPREHENSIVE SIC SOLUTION FOR INDUSTRIAL APPLICATIONS

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## Silicon Carbide – Ready for Industrial Scale

Silicon Carbide (SiC) is a wide bandgap semiconductor material that offers significantly higher critical electric field strength, high saturation velocity and thermal conductivity compared to conventional silicon. These material advantages enable higher efficiency, increased power density, faster switching operation, and more compact system designs. SiC power technology has now reached full maturity, making it a key enabler for systems such as renewable energy generation, EV charging infrastructure, energy storage, industrial power supplies, and data centers.

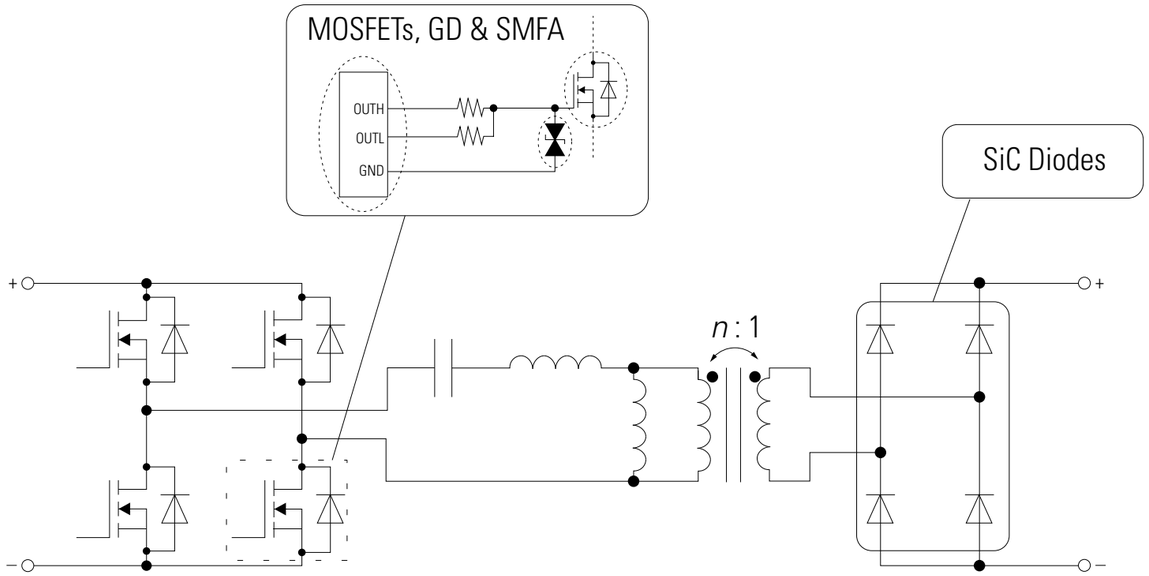
## A Complete Littelfuse SiC Power Solution

Littelfuse offers a comprehensive SiC power portfolio that combines high performance SiC MOSFETs and Schottky diodes with gate drivers and dedicated protection devices. Together, these elements help simplify power stage design, enhance system robustness, and support faster development cycles. This catalogue presents Littelfuse's SiC offerings with a solution oriented perspective, enabling designers to build efficient, reliable, and scalable power systems.

## Why Littelfuse

Littelfuse combines power semiconductor expertise with decades of leadership in circuit and system protection. From advanced SiC devices in standard discrete and innovative isolated packages to gate drivers and protection solutions, Littelfuse supports key elements of the power conversion chain. Backed by global manufacturing, proven quality, and long term product roadmaps, Littelfuse is a trusted partner for reliable, industrial grade SiC power solutions. Figure 1 illustrates a representative full bridge LLC DC - DC converter implementation using Littelfuse SiC MOSFETs, SiC Schottky diodes, gate drivers, and SMFA asymmetric TVS gate protection devices.

**Figure 1. Littelfuse full SiC solution for LLC Converter**




**Note:** GD : Gate Driver.

# New Silicon Carbide MOSFETs in Standard Discrete Packages

## Introduction

Littelfuse introduces its latest Silicon Carbide MOSFETs series. Available in standard discrete THT and SMT packages.

### Applications

- Energy storage systems
- Renewable energy systems
- Switched-mode power supplies
- Industrial process power supplies
- Servers and data centers

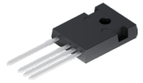
### Features

- 650 V & 1200 V blocking voltage with $R_{DS(on)}$ ranges from 8.5 mΩ to 160 mΩ
- SiC MOSFET technology with $V_{GS(off)}$ = -3.5 V to -2 V and $V_{GS(on)}$ = 15 V to 18 V
- Low gate charge and low capacitance
- Ultra-fast intrinsic body diode
- Kelvin source connection
- Stable $R_{DS(on)}$ across the junction temperature range

### Benefits

- High blocking voltage and low conduction losses
- Compatible with commercial gate drivers
- High switching speed with low losses
- Suitable for hard-switching
- Optimized gate control
- Enables predictable conduction losses over temperature, simplifying thermal design and improving system reliability

**TO247-4L**



**TO263-7L**

**TOLL**

**QDPAK**

| Part Number | Features | Voltage Class | $R_{DS(on)}$ | $I_{D25}$ | Package | Availability |
|---|---|---|---|---|---|---|
| IXSH20N120L2KHV | Kelvin source | 1200 V | 160 mΩ | 20 A | TO247-4L | Released |
| IXSH40N120L2KHV | Kelvin source | 1200 V | 80 mΩ | 40 A | TO247-4L | Released |
| IXSH65N120L2KHV | Kelvin source | 1200 V | 40 mΩ | 65 A | TO247-4L | Released |
| IXSH80N120L2KHV | Kelvin source | 1200 V | 30 mΩ | 80 A | TO247-4L | Released |
| IXSA20N120L2-7 | Kelvin source | 1200 V | 160 mΩ | 20 A | TO263-7L | Released |
| IXSA40N120L2-7 | Kelvin source | 1200 V | 80 mΩ | 40 A | TO263-7L | Released |
| IXSA65N120L2-7 | Kelvin source | 1200 V | 40 mΩ | 65 A | TO263-7L | Released |
| IXSA80N120L2-7 | Kelvin source | 1200 V | 30 mΩ | 80 A | TO263-7L | Released |
| IXSH150N120L3KHV | Kelvin source | 1200 V | 13 mΩ | 150 A | TO247-4L | Released |
| IXSH110N120L3KHV | Kelvin source | 1200 V | 18 mΩ | 110 A | TO247-4L | Released |
| IXSH100N120L3KHV | Kelvin source | 1200 V | 21 mΩ | 100 A | TO247-4L | Released |
| IXSH65N120L3KHV | Kelvin source | 1200 V | 35 mΩ | 65 A | TO247-4L | Released |
| IXSH50N120L3KHV | Kelvin source | 1200 V | 55 mΩ | 50 A | TO247-4L | Released |
| IXSH100N65L2KHV | Kelvin source | 650 V | 25 mΩ | 100 A | TO247-4L | Released |
| IXSH60N65L2KHV | Kelvin source | 650 V | 40 mΩ | 60 A | TO247-4L | Released |
| IXSA110N65L2-7TR | Kelvin source | 650 V | 25 mΩ | 110 A | TO263-7L | Released |
| IXSA60N65L2-7TR | Kelvin source | 650 V | 40 mΩ | 60 A | TO263-7L | Released |
| IXSA40N65L2-7TR | Kelvin source | 650 V | 60 mΩ | 40 A | TO263-7L | Released |
| IXSG110N65L2K | Kelvin source | 650 V | 25 mΩ | 110 A | TOLL | Released |
| IXSG60N65L2K | Kelvin source | 650 V | 40 mΩ | 60 A | TOLL | Released |
| IXSG40N65L2K | Kelvin source | 650 V | 60 mΩ | 40 A | TOLL | Released |
| IXSQD240N75L3-TR | Kelvin Source, TSC[1] | 750 V | 8.5 mΩ | 240 A | QDPAK | Sampling / Release Q1'2027 |
| IXSQD65N120L3-TR | Kelvin Source, TSC | 1200 V | 35 mΩ | 65 A | QDPAK | Sampling / Release Q3'2026 |
| IXSQD150N120L3-TR | Kelvin Source, TSC | 1200 V | 13 mΩ | 150 A | QDPAK | Sampling / Release Q4'2026 |
| IXSQD110N120L3-TR | Kelvin Source, TSC | 1200 V | 18 mΩ | 110 A | QDPAK | Sampling / Release Q4'2026 |

**Note1:** TSC - Top Side Cooling.





# New Silicon Carbide MOSFETs in Littelfuse Isolated Packages in Discrete and Half Bridge Configuration

## Introduction

Littelfuse introduces the latest SiC MOSFETs in its proprietary high-performance, ceramic - based isolated packages available in single-switch and half-bridge configurations.

### Applications

- Energy storage systems
- Renewable energy systems
- Switched-mode power supplies
- Industrial process power supplies
- Motor drives

### Features

- Flexible gate voltage range (15 – 18 V) and 0 V recommended turn-off gate voltage
- 1200 V blocking voltage with low on-state resistance
- Low gate charge and low input capacitance
- Multichip integration in top side cooled isolated package

### Benefits

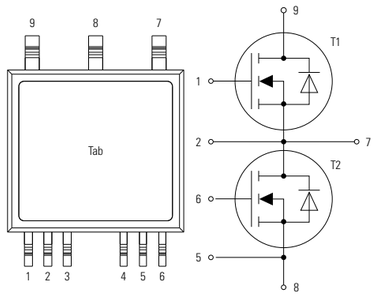
- Low gate drive power requirements and simplified gate control
- Low conduction losses and reduced heat dissipation
- Supports high-speed switching with reduced gate drive losses
- Reduces the number of discrete components and thermal management efforts

### Isolated Packages

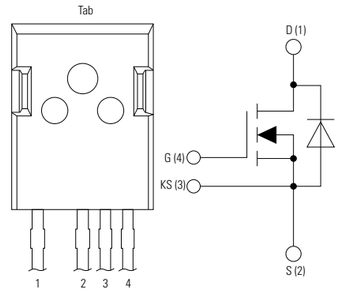
- High-performance ceramic based isolated package improves overall thermal resistance $R_{th(j-s)}$ and power handling capability
- Isolation voltage 2500 V AC (RMS), for 1 minute
- Reduced EMI attributed to the small chip-to-heatsink stray capacitance
- SMPD advanced top-side-cooled packaging simplifies thermal management
- SMPD package reduces effective power loop inductance, improving EMI performance in fast switching SiC application
- ISO247 packages are compatible with standard TO-247 package footprint
- Isolated package improves $R_{th(j-s)}$ up to 50 % compared to standard discretes
- Simplified isolation strategy and reduced overall BOM cost

**Figure 2. Pinout Configurations for Isolated Packages**

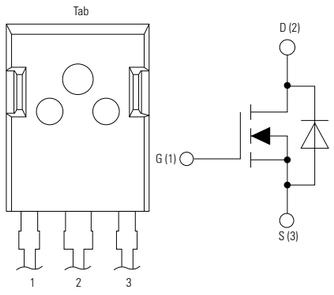
**a) Dual MOSFET, Half-Bridge Configuration in SMPD-B Package**




**b) Single MOSFET with Kelvin source Connection in ISO247-4L Package**

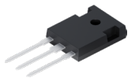



**c) Single MOSFET in ISO247-3L Package**

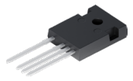


# New Silicon Carbide MOSFETs in Littelfuse Isolated Package

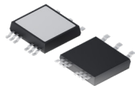
ISO247-3L



ISO247-4L



SMPD-B



## SiC MOSFETs in Discrete Isolated Package (ISO247)

| Part Number | Features | Voltage Class | $R_{DS(on)}$ | $I_{D25}$ | Package | Availability |
|---|---|---|---|---|---|---|
| IXSJ80N120R1 | Isolated | 1200 V | 18 mΩ | 80 A | ISO247-3L | Released |
| IXSJ43N120R1 | Isolated | 1200 V | 36 mΩ | 43 A | ISO247-3L | Released |
| IXSJ25N120R1 | Isolated | 1200 V | 62 mΩ | 25 A | ISO247-3L | Released |
| IXSJ80N120R1K | Isolated, Kelvin source | 1200 V | 18 mΩ | 80 A | ISO247-4L | Released |
| IXSJ43N120R1K | Isolated, Kelvin source | 1200 V | 36 mΩ | 43 A | ISO247-4L | Released |
| IXSJ25N120R1K | Isolated, Kelvin source | 1200 V | 62 mΩ | 25 A | ISO247-4L | Released |

## Half-Bridge in Isolated SMPD-B Package

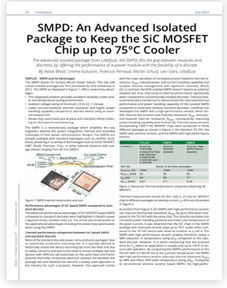
| Part Number | Features | Voltage Class | $R_{DS(on)}$ | $I_{D25}$ | Package | Availability |
|---|---|---|---|---|---|---|
| MCR19P1200LB | Half Bridge, Isolated, TSC | 1200 V | 62 mΩ | 25 A | SMPD-B | Sampling / Releasing Now |
| MCR19P1200TLB | Half Bridge, w/ NTC, isolated, TSC | 1200 V | 62 mΩ | 25 A | SMPD-B | Sampling / Release Q3 2026 |
| MCR29P1200LB | Half Bridge, TSC | 1200 V | 36 mΩ | 43 A | SMPD-B | Sampling / Releasing Now |
| MCR29P1200TLB | Half Bridge, w/ NTC, Isolated, TSC | 1200 V | 36 mΩ | 43 A | SMPD-B | Sampling / Releasing Now |
| MCR59P1200LB | Half Bridge, Isolated, TSC | 1200 V | 18 mΩ | 80 A | SMPD-B | Sampling / Releasing Now |
| MCR59P1200TLB | Half Bridge, w/ NTC, Isolated, TSC | 1200 V | 18 mΩ | 80 A | SMPD-B | Sampling / Releasing Now |

## Littelfuse High-Performance Ceramic Isolated Package

Littelfuse's high-performance, ceramic-based isolated packaging technology eliminates the need for external isolation materials by integrating a thermally efficient substrate, enabling improved heat dissipation, reduced junction-to-heatsink thermal resistance, and enhanced current and power handling capability, while simplifying system assembly and thermal design. The advanced SMPD isolated package further optimizes electrical and thermal performance through low parasitic inductance, integrated isolation, and compact design. These features enable faster switching, lower power losses, improved reliability, and stable operation under high-power and high-frequency conditions.

**For more information about the performance benefits using Littelfuse Isolated packages:**


High performance Ceramic based Advanced Isolated Discrete Package for SiC Mosfet Devices




An Advanced Isolated Package to Keep the SiC MOSFET Chip up to 75°C Cooler







# New Silicon Carbide Schottky Diodes

## Introduction

Littelfuse introduces a new SiC Schottky barrier diode family. Available in single and common-cathode configurations, these diodes come in standard through-hole and SMT packages. These diodes are optimized for use with SiC MOSFETs in PFC, LLC and hard-switching stages.

### Applications

- Energy storage systems
- Power factor correction
- Switched-mode power supplies
- Solar inverters
- UPS

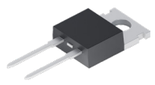
### Features

- High surge current capability
- Extremely fast, temperature - independent switching behavior
- Virtually zero reverse recovery current
- Low forward voltage
- Maximum virtual junction temperature of 175 °C

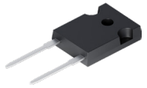
### Benefits

- Improved operational reliability under transient events
- Suitable for high frequency switching applications
- Reduced cooling efforts and improved system power density
- Improved system efficiency and reducing conduction losses
- Safe operation in high-temperature environments

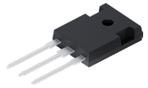
TO220-2L



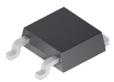
TO247-2L



TO247-3L



TO252-2L



TO263-2L

| Part Number | Voltage Class | $I_F$ | Package | Configuration | Availability |
|---|---|---|---|---|---|
| DCK10I1200HA | 1200 V | 10 A | TO247-2L | Single | Released |
| DCK15I1200HA | 1200 V | 15 A | TO247-2L | Single | Released |
| DCK20I1200HA | 1200 V | 20 A | TO247-2L | Single | Released |
| DCK30I1200HA | 1200 V | 30 A | TO247-2L | Single | Released |
| DCK40I1200HA | 1200 V | 40 A | TO247-2L | Single | Released |
| DCK10I1200PA | 1200 V | 10 A | TO220-2L | Single | Released |
| DCK10I1200UZ | 1200 V | 10 A | TO252-2L | Single | Released |
| DCK20C1200HB | 1200 V | 20 A | TO247-3L | Common Cathode | Released |
| DCK30C1200HB | 1200 V | 30 A | TO247-3L | Common Cathode | Released |
| DCK40C1200HB | 1200 V | 40 A | TO247-3L | Common Cathode | Released |
| DCK20I1200PC | 1200V | 20 A | TO263-2L | Single | Released |
| DCK10I650PA | 650 V | 10 A | TO220-2L | Single | Released |
| DCK10I650HA | 650 V | 10 A | TO247-2L | Single | Released |
| DCK20I650HA | 650 V | 20 A | TO247-2L | Single | Released |
| DCK20C650HB | 650 V | 20 A | TO247-3L | Common Cathode | Released |
| DCK20I650PC | 650 V | 20 A | TO263-2L | Single | Sampling / Release Q3'2026 |
| DCK40C650HB | 650 V | 40 A | TO247-3L | Common Cathode | Sampling / Release Q3'2026 |
| DCK60C650HB | 650 V | 60 A | TO247-3L | Common Cathode | Sampling / Release Q3'2026 |
| DCK40C650PC | 650 V | 40 A | TO263-2L | Common Cathode | Sampling / Release Q3'2026 |

# SMFA Series Asymmetric TVS Diodes for SiC MOSFET Gate Protection

## Introduction

Dedicated gate protection is critical for reliable long-term operation of SiC MOSFETs operating at high dV/dt. The SMFA Series are asymmetrical TVS diodes designed specifically to protect SiC MOSFETs gates from overvoltage events. Compared with silicon devices, SiC MOSFETs have lower negative gate voltage withstand capability, making asymmetrical protection using two separate TVS diodes, as shown in Figure 3, a common design choice. Littelfuse now offers the SMFA asymmetrical, bidirectional TVS diodes in a single package, reducing the parasitic effects and PCB area needed for fast-switching SiC applications.

### Applications

- AI / Data center server power supplies
- High-efficiency power for EVI
- High-reliability semiconductor / industrial power supplies

### Features

- Single component SiC MOSFET gate protection with asymmetrical gate voltage protection
- Low clamping voltage for negative gate drive, VC < 8 V @ 2 A (10/1000 µs)
- Variety of positive standoff voltages, VBR 15 ~ 20 V compatible with popular SiC MOSFETS
- Stable capacitance over wide range of operating frequency (2 MHz) compatible with SiC MOSFET applications
- Compact, 1mm low profile, SOD123-FL package

### Benefits

- Reduced part-count
- Reduced PCB-space
- Lower complexity, paired with higher reliability
- Precisely defined voltage levels

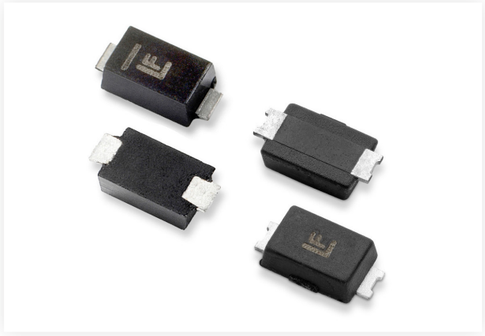
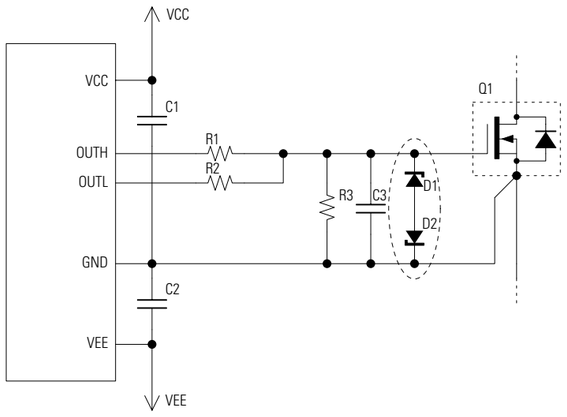
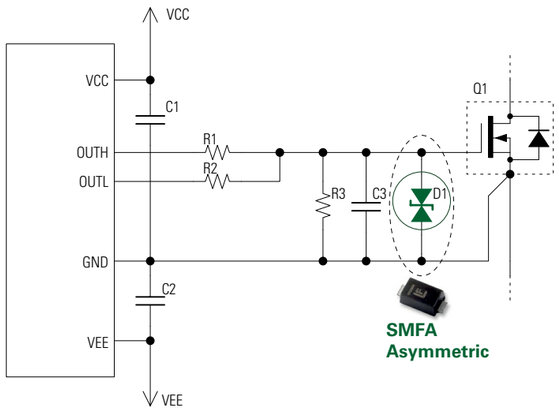


**Figure 3. Standard gate protection with two separate TVS diodes vs. one Asymmetric SMFA Series TVS Diode**

**a) Gate Protection Using 2 TVS Diodes**




**b) Gate Protection Using 1 SMFA Series TVS Diode**



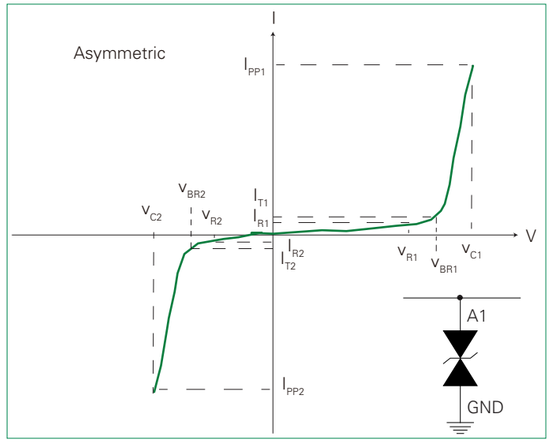





SMFA Series Asymmetric TVS Diodes for SiC MOSFET Gate Protection

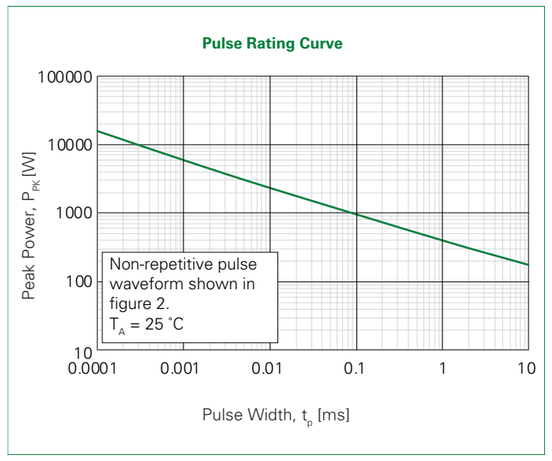
TVS Diode

## Curve Characteristics

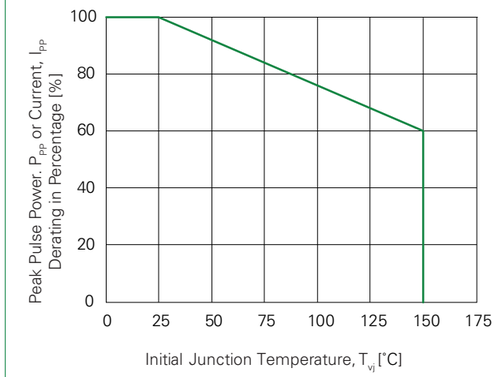



| Symbol | Characteristic Name | Explanation |
|---|---|---|
| $P_{PPM}$ | Peak Pulse Power Dissipation ($I_{PP}$ x $V_C$) | Max power dissipation |
| $V_{R\,1}$ / $V_{R\,2}$ | Stand-off Voltage | Maximum voltage that can be applied to the TVS without operation |
| $V_{BR\,1}$ / $V_{BR\,2}$ | Breakdown Voltage | Maximum voltage that flows though the TVS at a specified test current ($I_T$) |
| $V_{C1}$ / $V_{C2}$ | Clamping Voltage | Peak voltage measured across the TVS at a specified $I_{PPM}$ (peak impulse current) |
| $I_{R1}$ / $I_{R2}$ | Reverse Leakage Current | Current measured at $V_R$ |

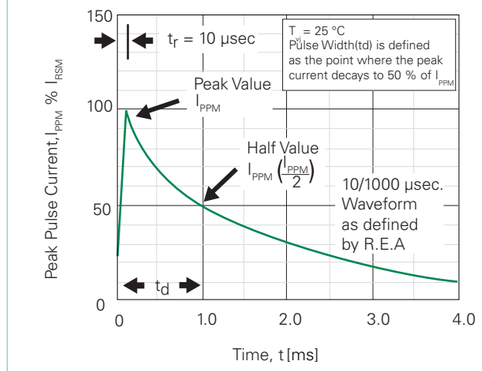
**Pulse Rating Curve**



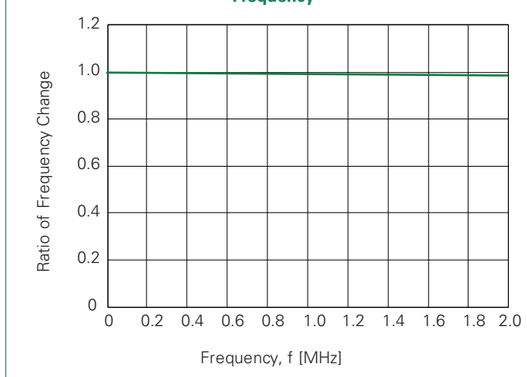

**Surge Derating Curve**




**10/1000 µs Pulse Waveform**




**Normalized Typical Junction Capacitance vs. Frequency**



# SMFA Series Asymmetric TVS Diodes for SiC MOSFET Gate Protection

## SMFA-series product portfolio

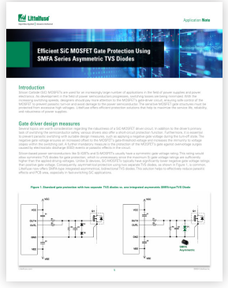
| Part Number | Marking | A1 — A2 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Maximum Reverse Leakage $I_{R1}$ @ $V_{R1}$ (µA) | Stand-off Voltage $V_{R1}$ (V) | Breakdown Voltage $V_{BR}$ (Volts) @ $I_{T1}$ Min. | Nom. | Max. | Typical Clamping Voltage $V_{C3}$@$I_{PP3}$ (V) | Typical Peak Pulse Current $I_{PP3}$ (A) | Maximum Clamping Voltage $V_{C1}$@ $I_{PP1}$ (V) | Maximum Peak Pulse Current $I_{PP1}$ (A) | Test Current $I_{T1}$ (mA) | Junction Capacitance Typ@ 1 MHz, 0 V Bias (pF) |
| SMFA1505CA | FM | 1 | 15 | 16.7 | 17.6 | 18.5 | 18.57 | 2 | 24.05 | 16.63 | 1 | 565 |
| SMFA1805CA | FT | 1 | 18 | 20.0 | 21.1 | 22.1 | 24.47 | 2 | 28.73 | 13.92 | 1 | 515 |
| SMFA1905CA | FU | 1 | 19 | 21.1 | 22.2 | 23.3 | 25.55 | 2 | 30.29 | 13.21 | 1 | 485 |
| SMFA2005CA | FV | 1 | 20 | 22.2 | 23.4 | 24.5 | 26.40 | 2 | 31.85 | 12.56 | 1 | 440 |

| Part Number | Marking | A1 — A2 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Maximum Reverse Leakage $I_{R2}$ @ $V_{R2}$ (µA) | Stand-off Voltage $V_{R2}$ (V) | Breakdown Voltage $V_{BR}$ Min. | Nom. | Max. | Typical Clamping Voltage $V_{C4}$@$I_{PP4}$ (V) | Typical Peak Pulse Current $I_{PP4}$ (A) | Maximum Clamping Voltage $V_{C2}$@ $I_{PP2}$ (V) | Maximum Peak Pulse Current $I_{PP2}$ (A) | Test Current $I_{T2}$ (mA) | Junction Capacitance Typ@1 MHz, 0 V Bias (pF) |
| SMFA1505CA | FM | 400 | 5.5 | 6.82 | 7.15 | 7.48 | 7.85 | 2 | 10.5 | 33.0 | 10 | 565 |
| SMFA1805CA | FT | 400 | 5.5 | 6.82 | 7.15 | 7.48 | 7.85 | 2 | 10.5 | 33.0 | 10 | 515 |
| SMFA1905CA | FU | 400 | 5.5 | 6.82 | 7.15 | 7.48 | 7.85 | 2 | 10.5 | 33.0 | 10 | 485 |
| SMFA2005CA | FV | 400 | 5.5 | 6.82 | 7.15 | 7.48 | 7.85 | 2 | 10.5 | 33.0 | 10 | 440 |

The SMFA asymmetric TVS solution integrates bidirectional protection in a single compact device, enabling precise gate voltage clamping, reduced component count, simplified PCB layout, and enhanced system reliability in high-efficiency SiC applications.

**For more information about the performance benefits using Littelfuse TVS solutions:**


SMFA Asymmetric TVS Diode Datasheet




Efficient SiC MOSFET Gate Protection Using TVS Diodes Application Note







# Optimized Gate Drive for Littelfuse SiC Power MOSFETs

## Introduction

Littelfuse SiC MOSFET gate drivers are designed to unlock the full performance of Littelfuse 650 V and 1200 V SiC MOSFETs by enabling fast, clean, and reliable switching. With optimized drive strength and robust protection features, these gate drivers seamlessly complement Littelfuse's SiC solutions for high efficiency power conversion applications.

### Applications

- EV chargers and DC fast charging stations
- Industrial inverters and motor drives
- Power supplies, UPS, and data center power
- PFC, AC/DC, and DC/DC converters

### Features

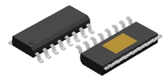
- High peak source and sink current capability for fast SiC switching
- TTL/CMOS compatible input logic for easy MCU/DSP interfacing
- Integrated protection features including UVLO, DESAT, and thermal shutdown
- Support for negative gate bias to improve dV/dt immunity (selected devices)
- Compact, thermally enhanced packages for high power density designs

### Benefits

- Maximizes SiC MOSFET performance by reducing switching losses and voltage ringing
- Improves system robustness with built-in protection against fault conditions
- Simplifies gate drive design by minimizing external components and bias supplies
- Enables high switching frequencies, supporting smaller passives and higher efficiency
- Seamless compatibility with Littelfuse 650 V and 1200 V SiC MOSFET families

**IXD704**

**IX4352NE**



**IX3407B**


| Parameter | IXD704 | IX4352NE | IX3407B |
|---|---|---|---|
| Gate Driver Type | Low-side, Dual Channel | Low-side with Charge Pump | Isolated, single channel |
| Peak Source / Sink Current | ±4 A per channel (±8 A paralleled) | ±9 A | ±7 A |
| Supply Voltage Range | +14 V to +35 V | +13 V to +25 V (–10 V neg. bias) | +13 V to +35 V |
| Negative Gate Bias | No | Yes, integrated charge pump (down to –10 V) | Via external supply |
| Logic Input Compatibility | TTL / CMOS | TTL / CMOS | TTL / CMOS |
| Enable Function | Yes (independent per channel) | No | No |
| Under-Voltage Lockout (UVLO) | Yes (9.5 V / 12.5 V ) | Yes (~10 V) | Yes |
| Propagation Delay (typ.) | 28 ns / 28 ns (ton / toff), '2ns matching' | 70 ns / 65 ns | 154 ns / 162 ns (ton / toff) |
| Rise / Fall Time (typ.) | 9 ns / 8 ns | 10 ns / 10 ns | 10 ns / 10 ns |
| Protection Features | UVLO, Latch-up Protection | DESAT, UVLO, TSD, Fault Output | Internal isolation, UVLO, ASD |
| Operating Junction Temperature | –40 °C to +150 °C | –40 °C to +125 °C | –50 °C to +150 °C |
| Package Options | SOIC-8, SOIC-8 EP, DFN-8 EP | 16-pin Narrow SOIC EP | SOIC-8 |

**Figure 4. IX3407B Typical Application Circuit**

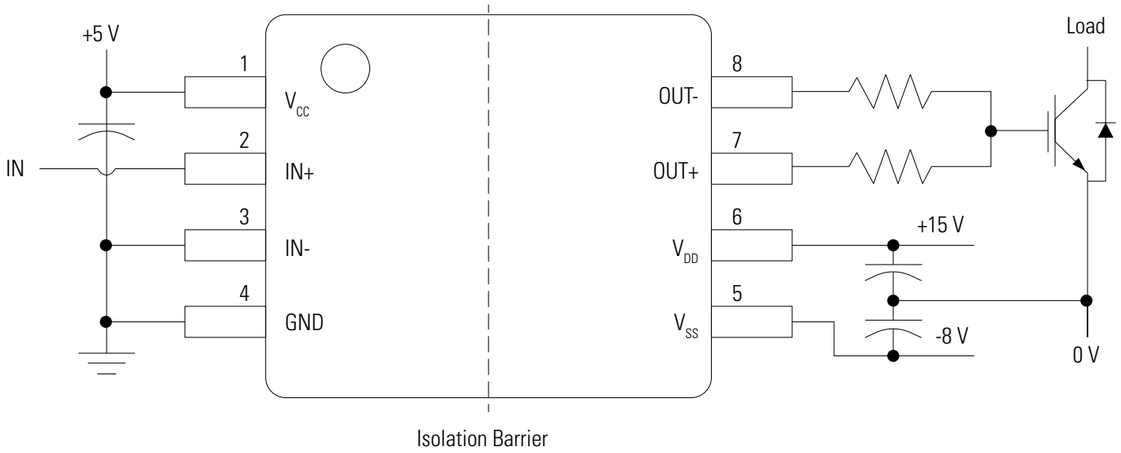
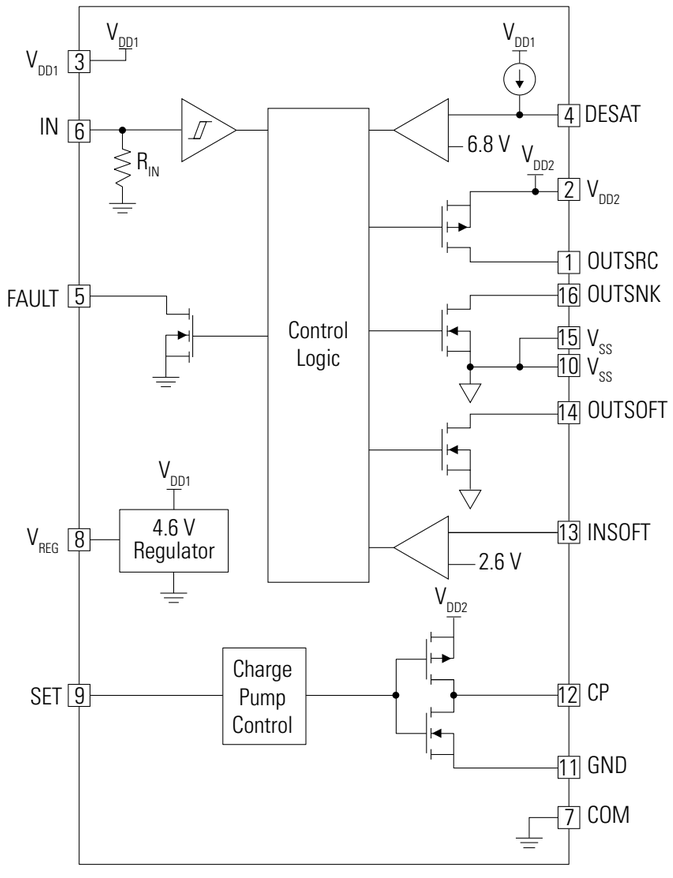



**Figure 5. IX4352NE Functional Block Diagram**





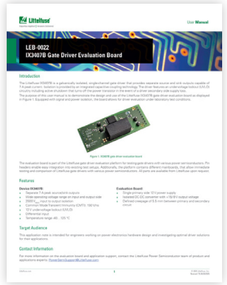



Gate Driver

Optimized Gate Drive for Littelfuse SiC Power MOSFETs

To support rapid design-in and validation of Littelfuse gate drivers, dedicated evaluation boards and accompanying application notes are available. These resources provide practical guidance on circuit implementation, protection features, and performance optimization under realistic operating conditions, enabling engineers to accelerate development and de-risk system integration.

**For more information about the eval board application notes:**




LEB-0022 IX3407B Gate Driver Evaluation Board


LEB-0023 IX4352NE Gate Driver Evaluation Board