

# SiC MOSFET Gate Driver Protection of EV OBC and Traction Inverters with Asymmetric TVS Diodes

## Overview

The TPSMB Asymmetrical TPSMBxx05 Series specifically protects Automotive SiC MOSFET gates driver from overvoltage events.

These devices feature asymmetrical reverse stand-off voltages, offering protection against positive and negative transients with different clamping in a single component. They are ideal for safeguarding on-board charger (OBC) driving circuits and traction inverters in Electric Vehicles (EVs).

## Features

- Offers asymmetrical gate driver voltage protection in one single component for SiC MOSFETs in the EV inverter and the OBC systems.
- Automotive grade solution designed in a compact DO-214AA (SMB) package.
- 600 W Pppm (peak pulse power) dissipation rating (10/1000  $\mu$ s waveform)
- Low clamping voltage for negative gate drive,  $V_C < 10$  V @ 30 A (8/20  $\mu$ s) with  $V_f = 5.0$  V

## Benefits

- Single component solution to replace multiple Zeners/TVS diodes and save space.
- Variety of positive standoff voltages ( $V_{BR}$  15 V ~ 20 V) are compatible with popular automotive SiC MOSFET applications.
- Stable capacitance over a wide range of operating frequencies (2 MHz) is ideal with the SiC MOSFET applications.



**Table 1. Electrical Characteristics for Asymmetric TVS Diodes** ( $T_A = 25$  °C unless otherwise noted)

Part Number	Marking	Maximum Reverse Leakage $I_{R1} @ V_{R1}$ ( $\mu$ A)	Stand off Voltage $V_{R1}$ (V)	K to A				Test Current $I_{T1}$ (mA)	Maximum Reverse Leakage $I_{R2} @ V_{R2}$ ( $\mu$ A)	Stand off Voltage $V_{R2}$ (V)	Breakdown Voltage $V_{BR}$ (V) @ $I_{T2}$		Maximum Clamping Voltage $V_{C2} @ I_{PP}$ 10/1000 $\mu$ s (V)	Maximum Peak Pulse Current $I_{PP2}$ 10/1000 $\mu$ s (A)	Maximum Clamping Voltage $V_{C2} @ I_{PP} = 30$ 8/20 $\mu$ s (V)	Test Current $I_{T2}$ (mA)
				Maximum Clamping Voltage $V_{C1} @ I_{PP}$ 10/1000 $\mu$ s (V)	Maximum Peak Pulse Current $I_{PP1}$ 10/1000 $\mu$ s(A)	Min	Max				Min	Max				
TPSMB1505CA	1505	1	15	16.7	18.5	24.4	24.6	1	500	5	6.8	7.4	11.5	60	10	10
TPSMB1805CA	1805	1	18	20.0	22.1	29.2	20.6	1	500	5	6.8	7.4	11.5	60	10	10
TPSMB2005CA	2005	1	20	22.2	24.5	32.4	18.6	1	500	5	6.8	7.4	11.5	60	10	10

