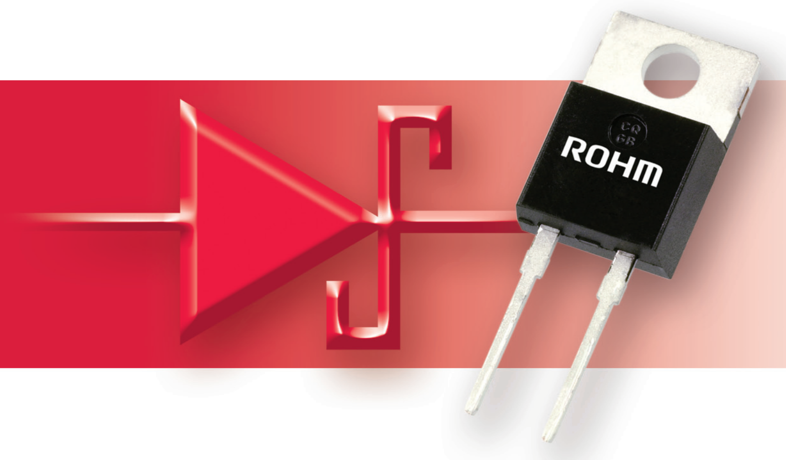
ROHM SEMICONDUCTOR

Innovations Embedded

Silicon Carbide
Schottky Barrier Diodes



Selection Guide

Presented by ROHM Semiconductor

ROHM Marketing USA

Silicon Carbide Schottky Barrier Diodes
from ROHM Semiconductor

ROHM SEMICONDUCTOR

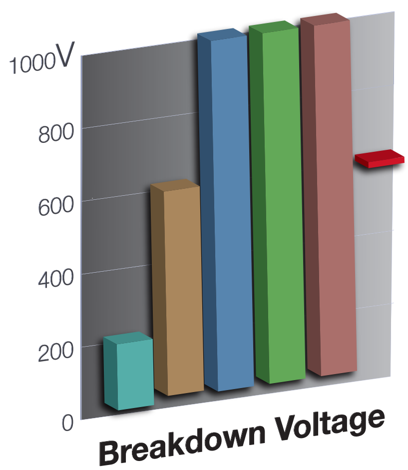
Choosing Silicon Carbide Instead of Silicon

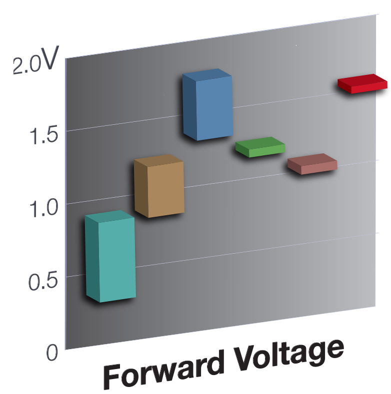
Schottky barrier diodes (SBDs) have the advantage of low forward losses and negligible switching losses compared to other diode technologies. But the narrow bandgap of silicon (Si) SBDs limits their use to a maximum voltage of around 200 V. Si diodes that operate above 200 V have higher V_F and t_{rr}.

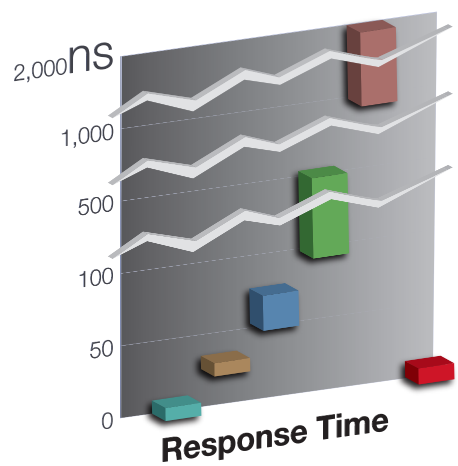
Silicon carbide (SiC) is a compound semiconductor with superior power characteristics to silicon, including a bandgap approximately three times greater, a dielectric breakdown field 10 times higher, and a thermal coefficient three times larger. These characteristics make it ideal for power electronics applications.

Today, the need for higher efficiency in end products is more critical than ever. Although silicon power products continue to see incremental improvements, devices based on compound semiconductor materials deliver significantly better performance — and in some cases not even possible with their silicon counterparts.

This is certainly true for the most basic components in power electronics: diodes and transistors. Silicon carbide Schottky barrier diodes have been available for more than a decade but have not been commercially viable until recently. Volume production is now leading to SiC's acceptance in more and more applications.







Legend

- Si Schottky Barrier Diode
- Si Super Fast Diode
- Si Ultra Fast Diode
- Si Fast Recovery (Epitaxial) Diode
- Si Standard Recovery Diode
- Silicon Carbide Schottky Barrier Diode

600V Diodes

SCS106AGC, SCS108AGC, SCS110AGC, SCS112AGC, and SCS120AGC

The SCS1xxAGC series of 600 V silicon carbide Schottky barrier diodes offers industry-leading low forward voltage and fast recovery time. They maintain low forward voltage (V_F) over a wide operating temperature range which results in lower power dissipation under actual operating conditions. Low V_F minimizes switching loss and enables high switching frequency, resulting in smaller passives and smaller end-product form factors.

Applications

- Power Factor Correction / SMPS
- Solar Inverters
- Motor Drives

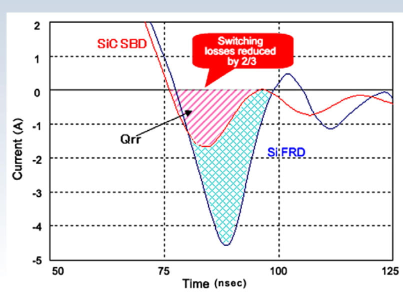
Important Features / Advantages

- Extremely low switching loss
- Excellent thermal conductivity and high operating temperature eliminates or greatly reduces heat sink requirements
- Reduced EMI emission

DESIGN NOTE

SiC Performance Improvement over Si FRD

With an SiC Schottky barrier diode (SBD), switching losses are reduced by 2/3 compared to a silicon fast recovery diode (FRD).
(The Si FRD is used for comparison since it has a comparable voltage rating to the SiC SBD.)



Part No.	Reverse voltage (V)	Continuous forward current (A)	Forward voltage (V)		Reverse current (µA)		Total power dissipation (W)	Capacitive charge (nC)	Switching time (ns)	Total capacitance (pF)	Thermal resistance (°C/W)	Package
	V_{RM}	I_F	V_{RM} (typ) Tj = 25°C/150°C	V_{RM} (max)	I_R (typ) Tj = 25°C/150°C	I_R (max)	P_D	Q_C	t_C	C V_R = 1V/V_R = 600V	$R_{th(j-c)}$	
SCS106AGC	600	6	1.5/1.6	1.7	1.2/6	120	48	12	18	260/28	2.6	TO220AC 2L
SCS108AGC	600	8	1.5/1.6	1.7	1.6/8	160	52	15	15	345/38	2.4	TO220AC 2L
SCS110AGC	600	10	1.5/1.6	1.7	2.0/10	200	57	16	15	430/47	2.2	TO220AC 2L
SCS112AGC	600	12	1.5/1.6	1.7	2.4/12	240	80	22	16	516/56	1.6	TO220AC 2L
SCS120AGC	600	20	1.5/1.6	1.7	4.0/20	400	97	35	19	860/93	1.3	TO220AC 2L

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