

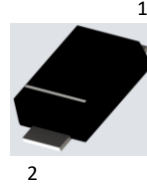
# Silicon Carbide Merged PN-Schottky Diode

## 650V SiC MPS High Speed Rectifier – Cheetah Series

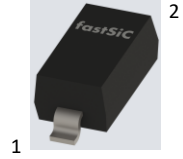


### Product Information:

Cathode  Anode



**SMAF**



**SOD-123**

### Features

- Low Capacitive Charge ( $Q_C$ )
- Low Profile & Low Parasitic Inductance Packaging
- Zero Reverse Recovery and zero Forward Recovery
- Ultra-Low Switching Loss
- Optimized for High Speed Applications
- Compact SMT Package
- RoHS Compliant and Halogen Free

Terminal	Packaging Type	
	SMAF	SOD-123
Anode	1	1
Cathode	2	2

### Benefits

- Higher System Efficiency
- Increase Parallel Device Convenience
- Enable High Temperature Application
- Allow High Frequency Operation
- Realize Compact and Lightweight Systems
- High Reliability

### Potential Applications

- Switching Mode Power Supply
- Power Factor Correction
- Portable Adaptor
- Renewable Energy

### Key Performance Parameters

Parameter	Symbol	Value	Unit
DC Blocking Voltage	$V_R$	650	V
Nominal Forward Current	$I_{F,NOM}$	4	A
Total Capacitive Charge	$Q_C$	6.2	nC
Capacitance Stored Energy	$E_C$	0.92	$\mu$ J
Junction & Storage Temperature	$T_J, T_{stg}$	-55 to 150	$^{\circ}$ C
Continuous Forward Current	$I_{F,max(cont.)}$	4.3	A
$I^2t$ Value	$\int i^2 dt$	0.53	A <sup>2</sup> s
Power Dissipation	$P_{tot}$	8.3	W

Part Number	Package	Marking
FC06004Y	SMAF	C64
FC06004Z	SOD-123	C64

For further information about comparable products, please contact ([www.fastsic.com](http://www.fastsic.com)).

**Maximum Ratings:**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Continuous Forward Current	$I_F$	--	--	3.1 4.0 4.3	A	$T_c \leq 75^\circ\text{C}$ , Duty=100% $T_c \leq 35^\circ\text{C}$ , Duty=100% $T_c \leq 25^\circ\text{C}$ , Duty=100%
Non-Repetitive Forward Surge Current, Sinusoidal Halfwave	$I_{F,SM}$	--	--	10		$T_c = 25^\circ\text{C}$ , $t_p = 10\text{ms}$
Non-Repetitive Peak Forward Surge Current	$I_{F,max}$	--	--	131		$T_c = 25^\circ\text{C}$ , $t_p = 10\mu\text{s}$
$I^2t$ Value	$\int i^2 dt$	--	--	0.53	A <sup>2</sup> s	$T_c = 25^\circ\text{C}$ , $t_p = 10\text{ms}$
Repetitive Peak Reverse Voltage	$V_{RRM}$	--	--	650	V	$T_c = 25^\circ\text{C}$
Power Dissipation	$P_{tot}$	--	--	8.3	W	$T_c = 25^\circ\text{C}$
Junction Temperature	$T_j$	-55	--	150	°C	--
Storage Temperature	$T_{stg}$	-55	--	150		
Soldering Temperature	$T_l$	--	--	260		

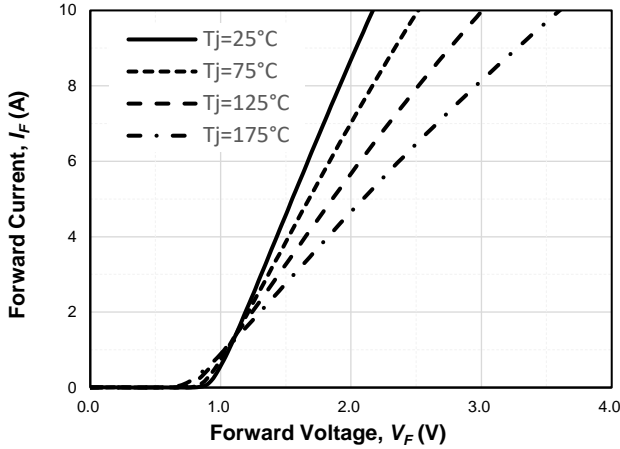
**Electrical Characteristics:**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions	
<b>DC Characteristics</b>							
DC Blocking Voltage	$V_{DC}$	650	--	--	V	$T_j = 25^\circ\text{C}$	
Forward Voltage	$V_F$	--	1.41 1.78	1.85 --		$I_F = 4\text{A}$ , $T_j = 25^\circ\text{C}$ $I_F = 4\text{A}$ , $T_j = 175^\circ\text{C}$	
Reverse Current	$I_R$	--	0.5 7	35 --	μA	$V_R = 520\text{V}$ , $T_j = 25^\circ\text{C}$ $V_R = 520\text{V}$ , $T_j = 175^\circ\text{C}$	
<b>AC Characteristics</b>							
Total Capacitive Charge	$Q_C$	--	6.2	--	nC	$V_R = 400\text{V}$ , $T_j = 25^\circ\text{C}$	
Total Capacitance	$C_j$	--	98 12 9.5	--	pF	$V_R = 1\text{V}$ , $f = 1\text{MHz}$ , $T_j = 25^\circ\text{C}$ $V_R = 200\text{V}$ , $f = 1\text{MHz}$ , $T_j = 25^\circ\text{C}$ $V_R = 400\text{V}$ , $f = 1\text{MHz}$ , $T_j = 25^\circ\text{C}$	
Capacitance Stored Energy	$E_C$	--	0.92	--		μJ	$V_R = 400\text{V}$ , $T_j = 25^\circ\text{C}$

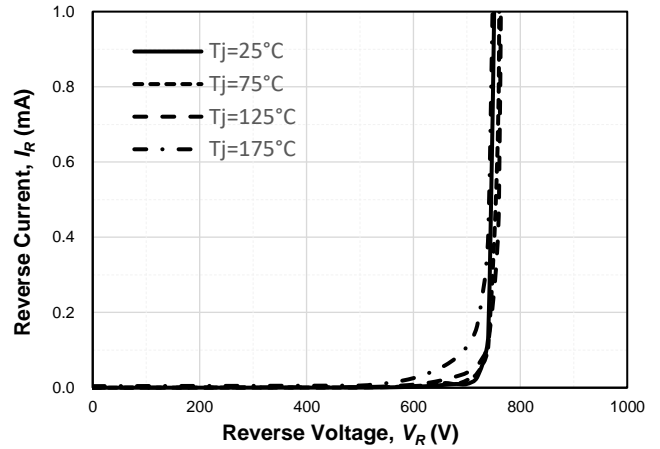
**Thermal Characteristics:**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Thermal Impedance, junction – case	$R_{th-jc}$	--	15	--	K/W	--
Thermal Impedance, junction – ambient	$R_{th-ja}$	--	35	--		Device mounted on 2inch*2inch Al board.

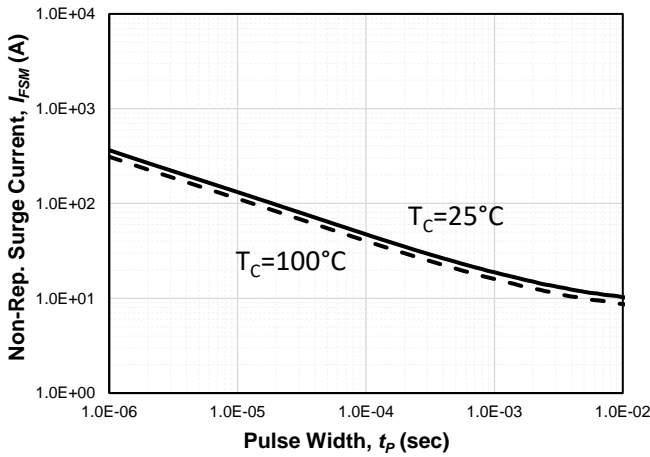
**Electrical Characteristics Diagrams**



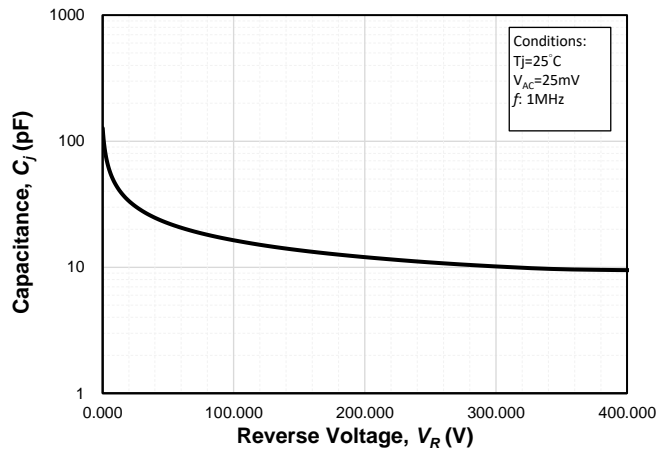
**Fig. 1 Forward Characteristics**



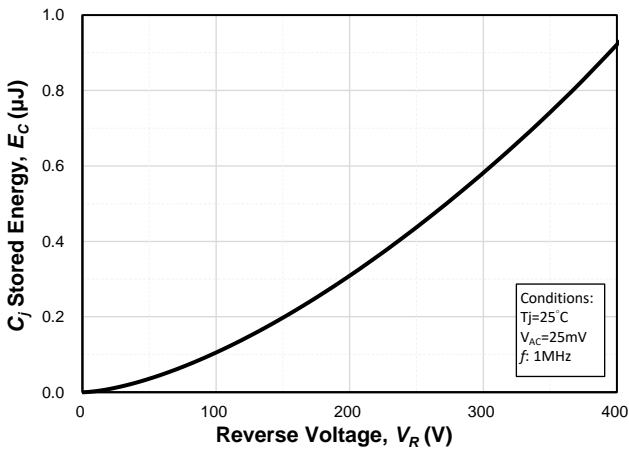
**Fig. 2 Reverse Characteristics**



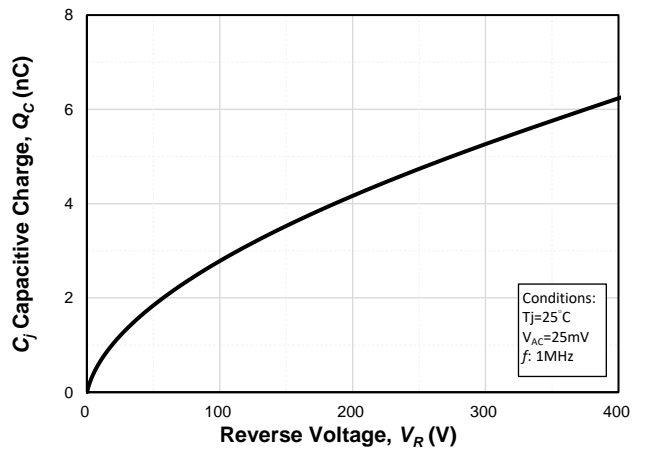
**Fig. 3 Non-repetitive Peak Forward Surge Current vs. Pulse Width**



**Fig. 4 Capacitance vs. Reverse Voltage**

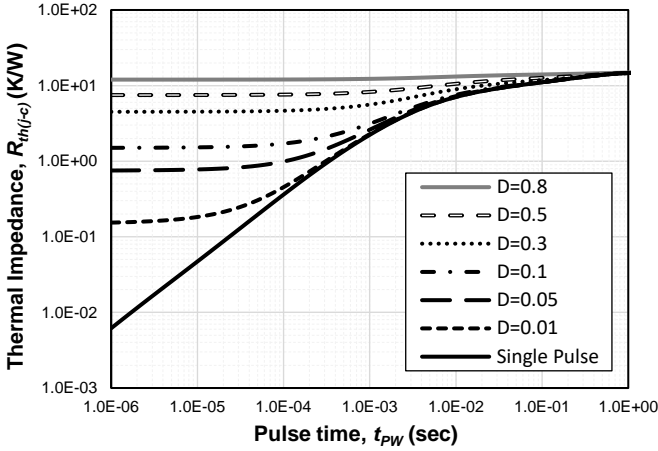


**Fig. 5 Capacitance Stored Energy vs. Reverse Voltage**

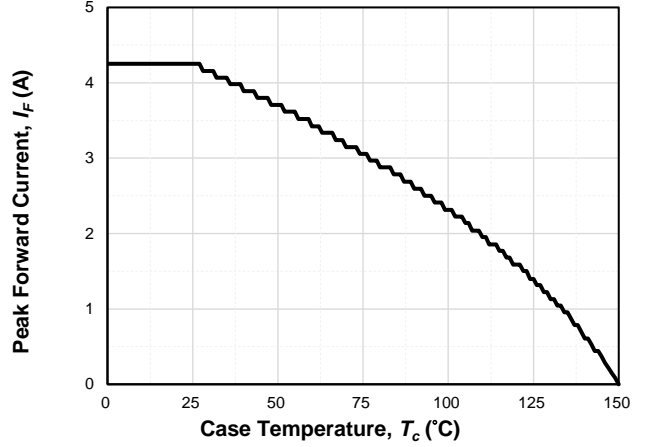


**Fig. 6 Capacitive Charge vs. Reverse Voltage**

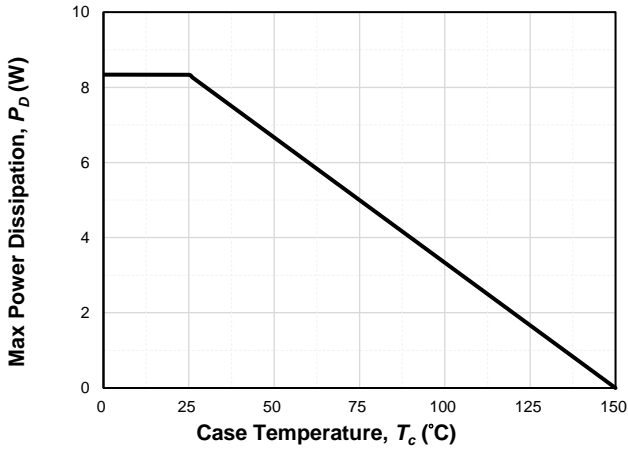
**Electrical Characteristics Diagrams**



**Fig. 7** Typ. Transient Thermal Impedance  $R_{th-jc}$

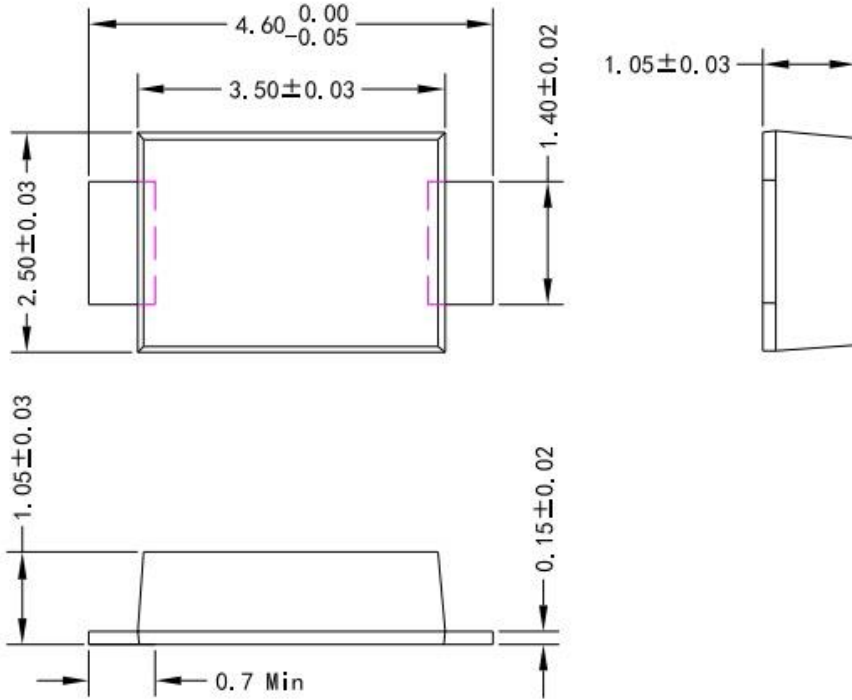


**Fig. 8** Continuous  $I_F$  De-rating

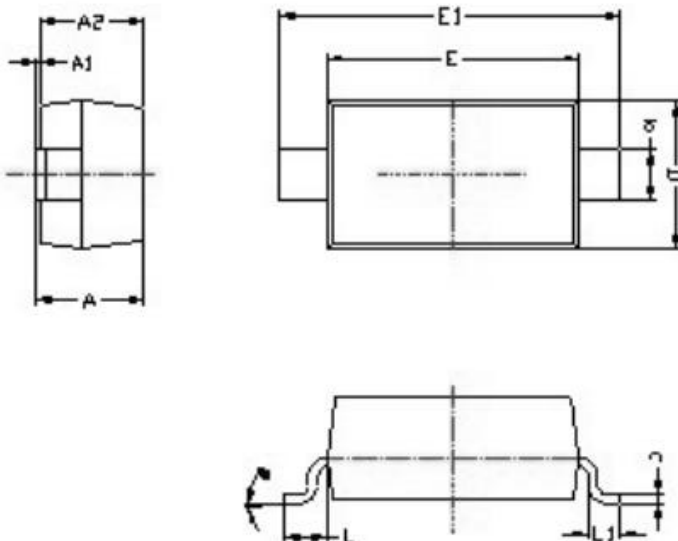


**Fig. 9** Power Dissipation

**Package Outline (SMAF)**



**Package Outline (SOD-123)**



SYMBOL	DIMENSIONS	
	MIN.	MAX.
A	1.050	1.250
A1	0.000	0.100
A2	1.050	1.150
b	0.450	0.650
c	0.080	0.150
D	1.500	1.700
E	2.600	2.800
E1	3.550	3.850
L	0.500REF	
L1	0.250	0.450
θ	0°	8°

## Revision History

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Date	Revision	Changes
10.22	Tentative	Minor revision
07.24	Preliminary	Revision and Update the data
08.24	Preliminary	Revision the package information

## Important Note (Disclaimer)

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Hsinchu, Taiwan  
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