



# WN5C051200

Silicon Carbide Diode

Rev.02 - 2 July 2019

Product data sheet

## 1. General description

Silicon Carbide Schottky diode in a TO220-2L plastic package, designed for high frequency switched-mode power supplies.



## 2. Features and benefits

- Highly stable switching performance
- High forward surge capability  $I_{FSM}$
- Extremely fast reverse recovery time
- Superior in efficiency to Silicon Diode alternatives
- Reduced losses in associated MOSFET
- Reduced EMI
- Reduced cooling requirements
- RoHS compliant
- High junction operating temperature capability ( $T_{j(max)} = 175\text{ °C}$ )

## 3. Applications

- Power factor correction
- Telecom / Server SMPS
- UPS
- PV inverter
- PC Silverbox
- LED / OLED TV
- Motor Drives

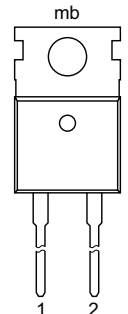
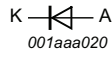
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
<b>Absolute maximum rating</b>						
$V_{RRM}$	repetitive peak reverse voltage		1200			V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 152\text{ °C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a> ; <a href="#">Fig. 4</a>	5			A
$T_j$	junction temperature		175			°C
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 5\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 6</a>	-	1.4	1.6	V
		$I_F = 5\text{ A}$ ; $T_j = 150\text{ °C}$ ; <a href="#">Fig. 6</a>	-	1.85	2.3	V
		$I_F = 5\text{ A}$ ; $T_j = 175\text{ °C}$ ; <a href="#">Fig. 6</a>	-	2	2.6	V
<b>Dynamic characteristics</b>						
$Q_r$	recovered charge	$I_F = 5\text{ A}$ ; $V_R = 400\text{ V}$ ; $di_F/dt = 500\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 8</a>	-	13	-	nC

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode		
2	A	anode		
mb	K	mounting base; connected to cathode		

## 6. Ordering information

Table 3. Ordering information

Type number	Package name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
WNSC051200	TO220-2L	WNSC051200Q	Tube	50	SOD59A	30-Mar-2015

## 7. Marking

Table 4. Marking codes

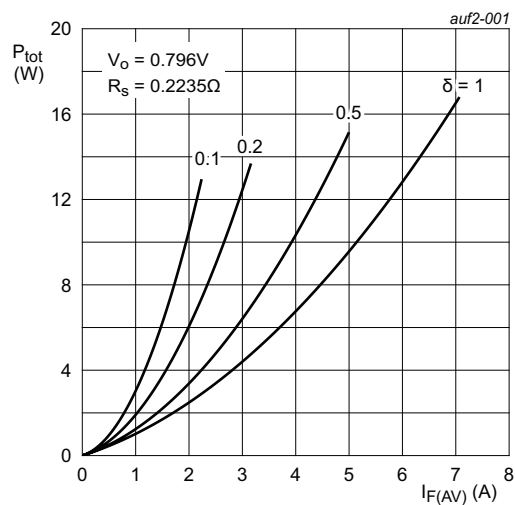
Type number	Marking codes
WNSC051200	WNSC051200

## 8. Limiting values

**Table 5. Limiting values**

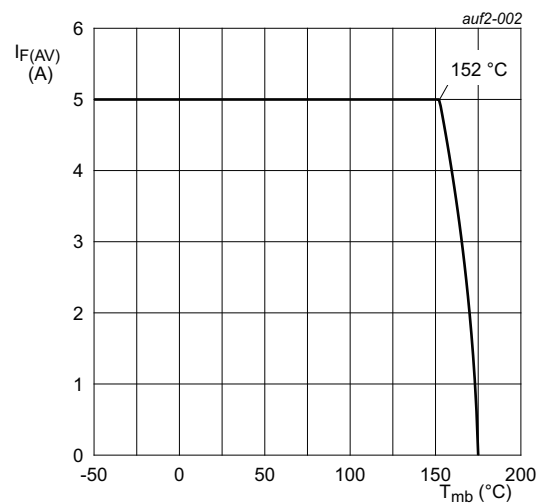
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Values	Unit
$V_{RRM}$	repetitive peak reverse voltage		1200	V
$V_{RWM}$	crest working reverse voltage		1200	V
$V_R$	reverse voltage	DC	1200	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 152\text{ }^\circ\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a> ; <a href="#">Fig. 4</a>	5	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_{mb} \leq 152\text{ }^\circ\text{C}$ ; square-wave pulse	10	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; sine-wave pulse	65	A
		$t_p = 10\text{ }\mu\text{s}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; sine-wave pulse	525	A
$I^2t$	$I^2t$ for fusing	sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; $t_p = 10\text{ ms}$	21	$\text{A}^2\text{s}$
$T_{stg}$	storage temperature		-55 to 175	$^\circ\text{C}$
$T_j$	junction temperature		175	$^\circ\text{C}$



$$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$$

**Fig. 1. Forward power dissipation as a function of average forward current; square waveform; typical values**



**Fig. 2. Forward current as a function of mounting base temperature; typical values**

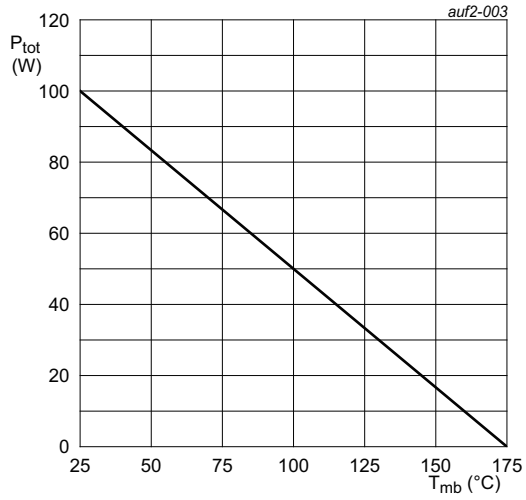


Fig. 3. Total power dissipation as a function of mounting base temperature

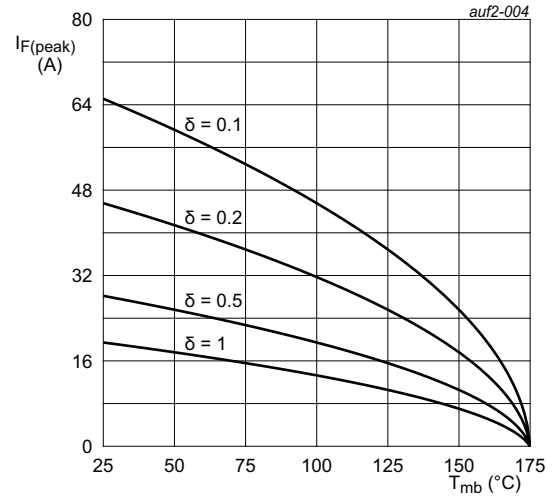


Fig. 4. Current derating as a function of mounting base temperature

## 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	<a href="#">Fig. 5</a>	-	-	1.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	60	-	K/W

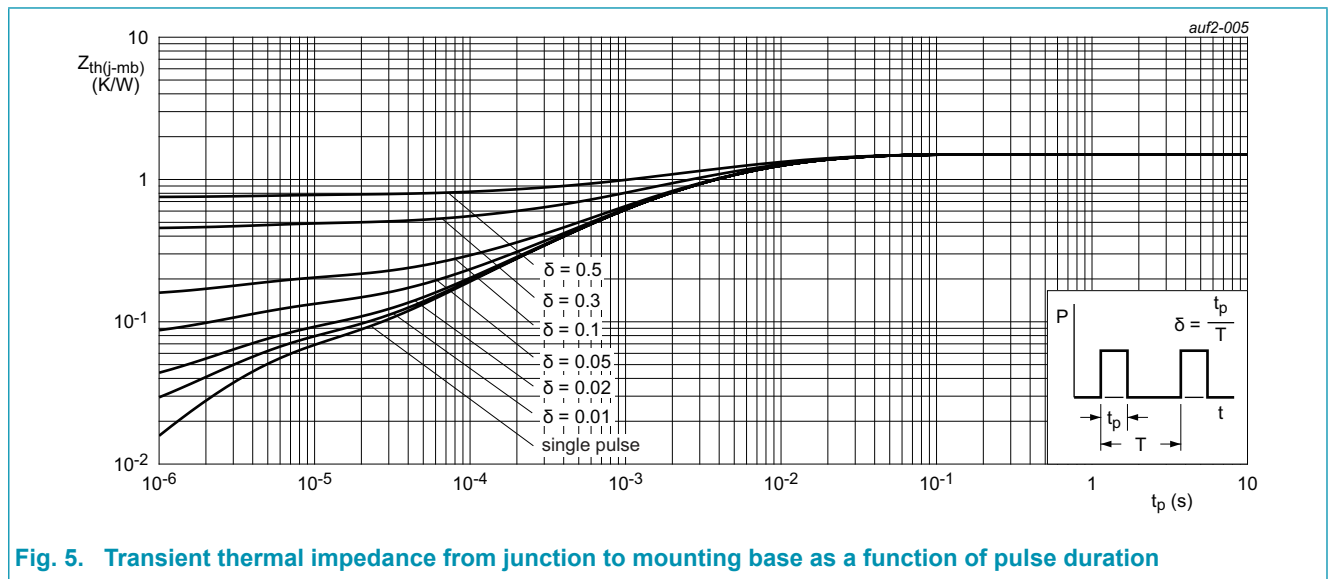
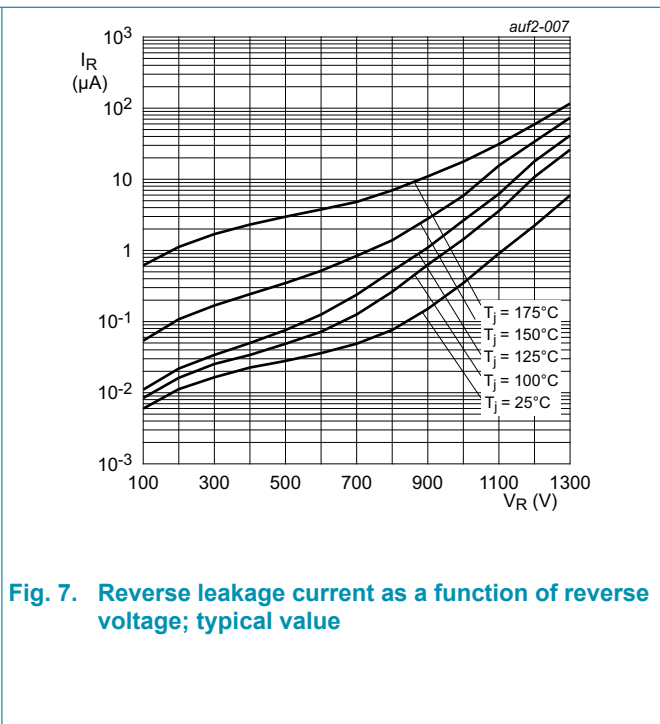
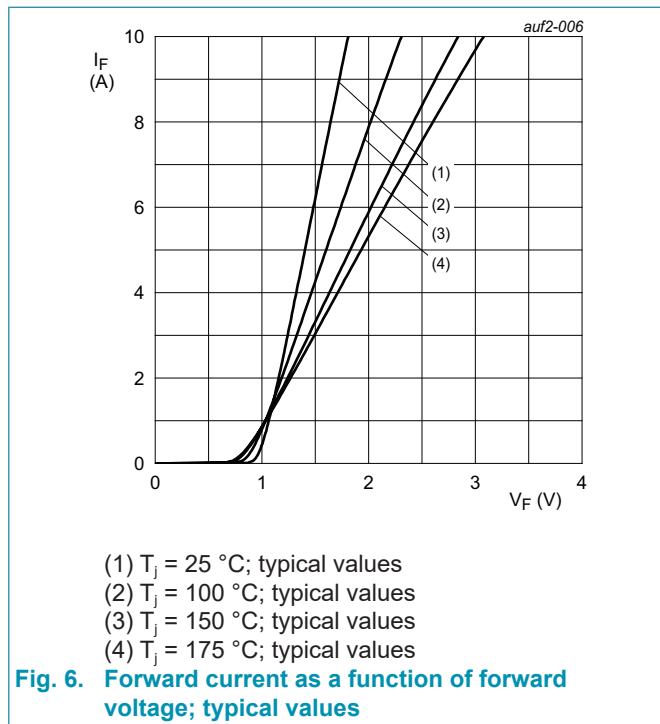


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

### 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward current	$I_F = 5\text{ A}; T_j = 25\text{ }^\circ\text{C}; \text{ Fig. 6}$	-	1.4	1.6	V
		$I_F = 5\text{ A}; T_j = 150\text{ }^\circ\text{C}; \text{ Fig. 6}$	-	1.85	2.3	V
		$I_F = 5\text{ A}; T_j = 175\text{ }^\circ\text{C}; \text{ Fig. 6}$	-	2	2.6	V
$I_R$	reverse current	$V_R = 1200\text{ V}; T_j = 25\text{ }^\circ\text{C}; \text{ Fig. 7}$	-	-	100	$\mu\text{A}$
		$V_R = 1200\text{ V}; T_j = 175\text{ }^\circ\text{C}; \text{ Fig. 7}$	-	-	240	$\mu\text{A}$
<b>Dynamic characteristics</b>						
$Q_r$	recovered charge	$I_F = 5\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C}; \text{ Fig. 8}$	-	13	-	nC
$C_d$	diode capacitance	$f = 1\text{ MHz}; V_R = 1\text{ V}; T_j = 25\text{ }^\circ\text{C}$	-	250	-	pF
		$f = 1\text{ MHz}; V_R = 400\text{ V}; T_j = 25\text{ }^\circ\text{C}$	-	24.5	-	pF
		$f = 1\text{ MHz}; V_R = 800\text{ V}; T_j = 25\text{ }^\circ\text{C}$	-	22	-	pF



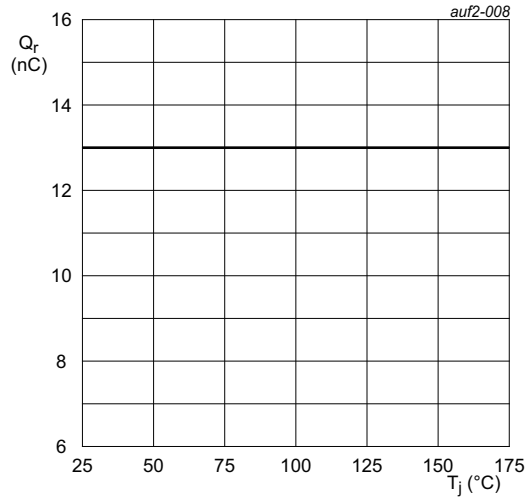
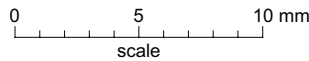
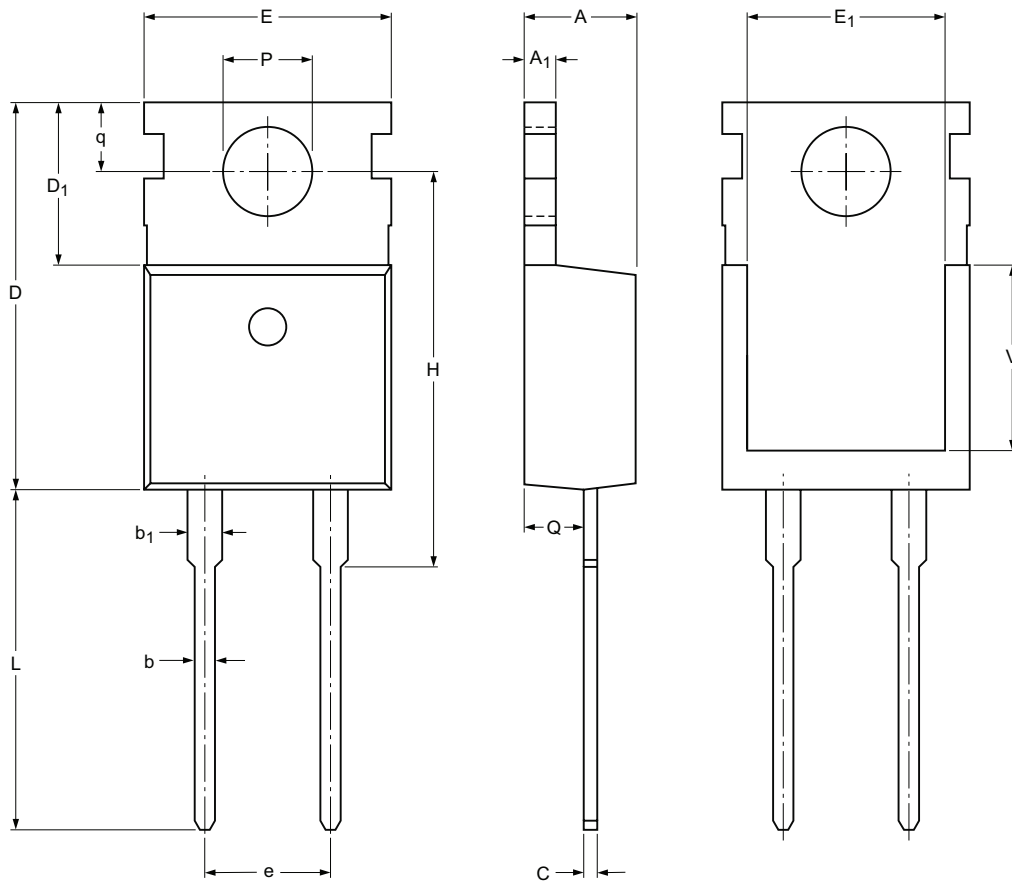


Fig. 8. Recovered charge as a function of junction temperature

### 11. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC

SOD59A



Dimensions: (mm are the original dimensions)

Unit	A	A <sub>1</sub>	b	b <sub>1</sub> ( <sup>1</sup> )	c	D	D <sub>1</sub>	E	e	H	L	P	Q	q	E <sub>1</sub>	V
mm	max 4.7	1.40	0.95	1.70	0.65	15.8	6.8	10.30	5.08	16.25	15.0	3.80	2.6	2.95	8.1	6.9
	nom								(REF)							(REF)
	min 4.3	1.15	0.70	1.17	0.45	15.6	6.4	9.65		15.70	12.5	3.53	2.2	2.65	7.9	

Note

1. Protruded dambar are included in the dimension.

sod059a\_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOD59A	TO-220AC (2-lead)					15-03-24 15-03-30



## 12. Legal information

### Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
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Date of release: 2 July 2019