

## 1. General description

Dual Silicon Carbide Schottky diode in a TO247-3L plastic package, designed for high frequency switched-mode power supplies.



**Lead-Free**

## 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

## 3. Applications

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

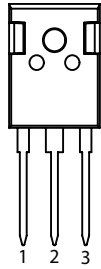
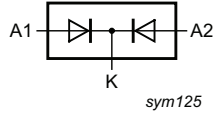
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
<b>Absolute maximum rating</b>						
$V_{RRM}$	repetitive peak reverse voltage		650			V
$I_{O(AV)}$	limiting average output current	$\delta = 0.5$ ; $T_{mb} \leq 129$ °C; square-wave pulse; both diodes conducting; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	16			A
$T_j$	junction temperature		175			°C
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 8$ A; $T_j = 25$ °C; per diode; <a href="#">Fig. 5</a>	-	1.5	1.7	V
		$I_F = 8$ A; $T_j = 150$ °C; per diode; <a href="#">Fig. 5</a>	-	1.8	2.1	V
		$I_F = 8$ A; $T_j = 175$ °C; per diode; <a href="#">Fig. 5</a>	-	1.95	2.25	V
<b>Dynamic characteristics</b>						
$Q_r$	recovered charge	$I_F = 8$ A; $V_R = 400$ V; $di_F/dt = 500$ A/ $\mu$ s; $T_j = 25$ °C; per diode; <a href="#">Fig. 7</a>	-	19	-	nC

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode		
2	K	cathode		
3	A2	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
WNSC16650CW	TO247	WNSC16650CWQ	Tube	30	TO247N	20-Jul-2016

## 7. Marking

Table 4. Marking codes

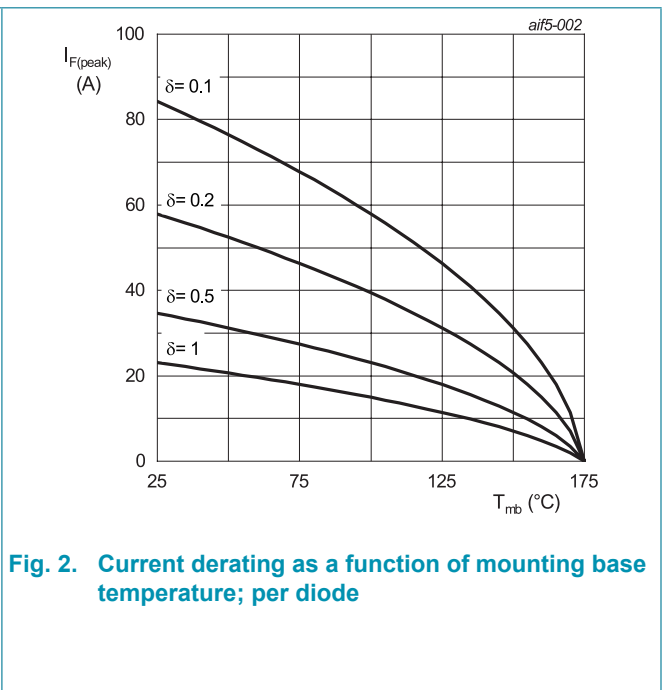
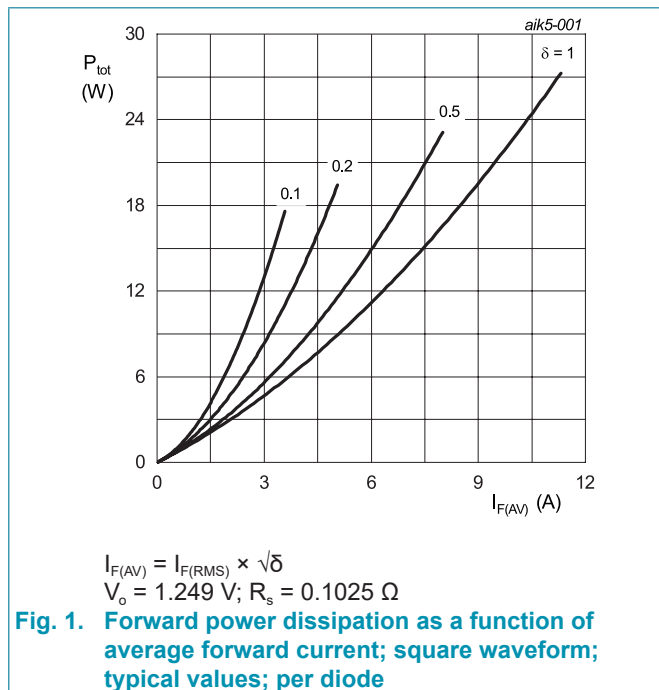
Type number	Marking codes
WNSC16650CW	WNSC 16650CW

## 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		650	V
$V_{RWM}$	crest working reverse voltage		650	V
$V_R$	reverse voltage	DC	650	V
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25 \mu s$ ; $T_{mb} \leq 129 \text{ }^\circ\text{C}$ ; square-wave pulse; per diode	16	A
$I_{O(AV)}$	limiting average output current	$\delta = 0.5$ ; $T_{mb} \leq 129 \text{ }^\circ\text{C}$ ; square-wave pulse; both diodes conducting; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	16	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; per diode	48	A
		$t_p = 10 \mu s$ ; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$ ; square-wave pulse; per diode	385	A
$I^2t$	$I^2t$ for fusing	sine-wave pulse; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$ ; $t_p = 10 \text{ ms}$ ; per diode	11.5	$\text{A}^2\text{s}$
$T_{stg}$	storage temperature		-55 to 175	$^\circ\text{C}$
$T_j$	junction temperature		175	$^\circ\text{C}$



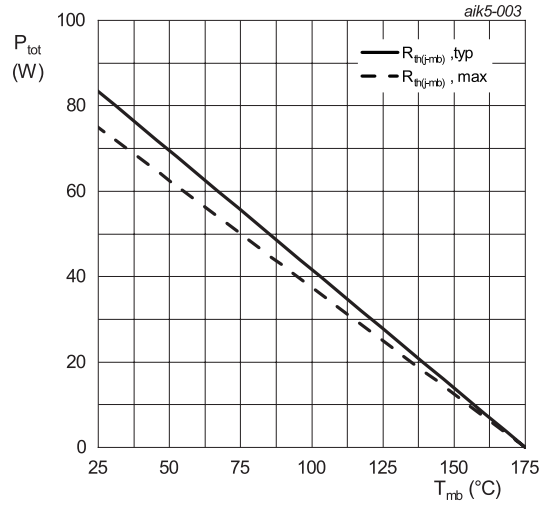


Fig. 3. Total power dissipation as a function of mounting base temperature; per diode

## 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	per diode; <a href="#">Fig. 4</a>	-	1.8	2	K/W
		both diodes conducting	-	0.9	1	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	40	-	K/W

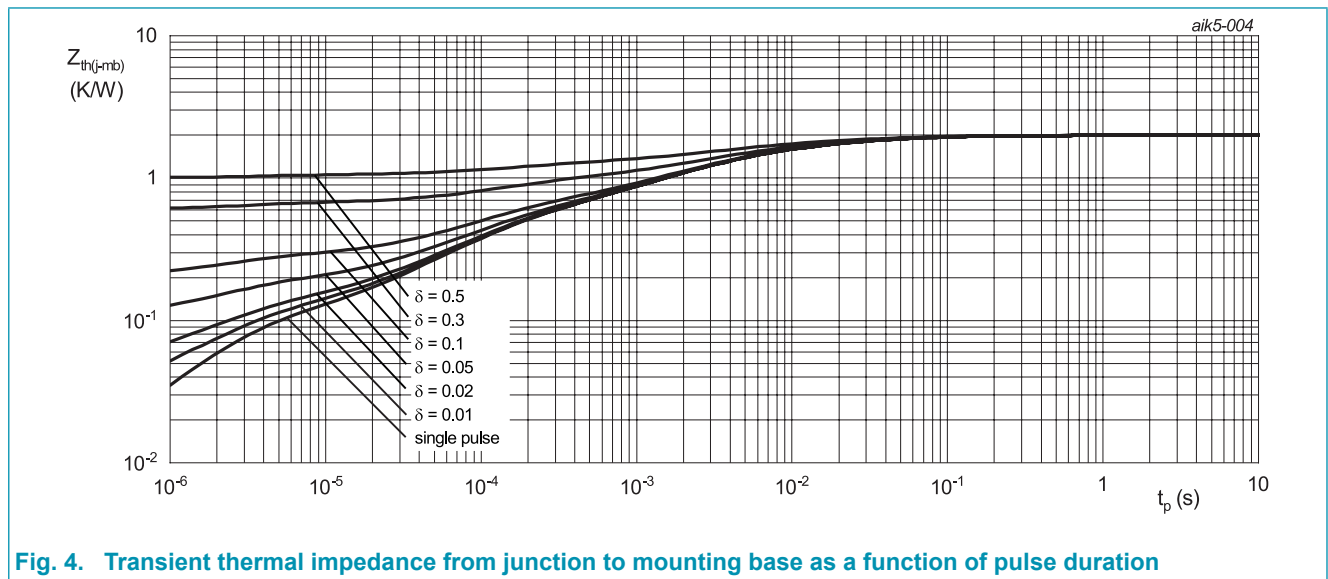
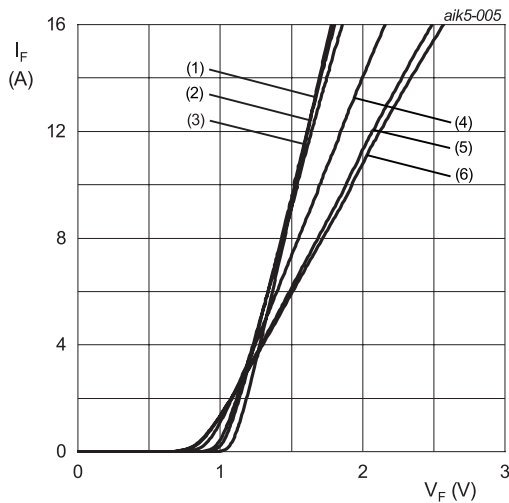


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

### 10. Characteristics

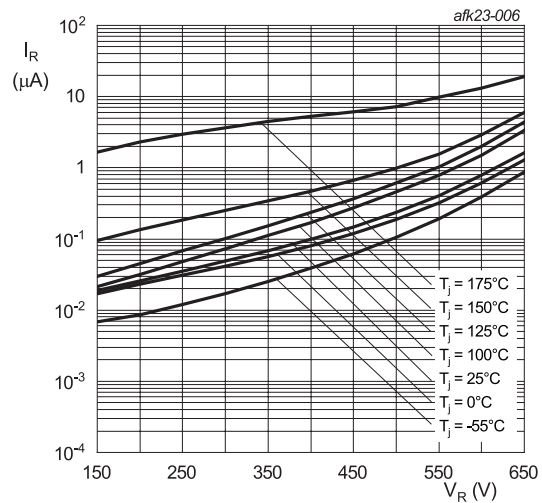
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward current	$I_F = 8\text{ A}; T_j = 25\text{ °C};$ per diode; <a href="#">Fig. 5</a>	-	1.5	1.7	V
		$I_F = 8\text{ A}; T_j = 150\text{ °C};$ per diode; <a href="#">Fig. 5</a>	-	1.8	2.1	V
		$I_F = 8\text{ A}; T_j = 175\text{ °C};$ per diode; <a href="#">Fig. 5</a>	-	1.95	2.25	V
$I_R$	reverse current	$V_R = 650\text{ V}; T_j = 25\text{ °C};$ per diode; <a href="#">Fig. 6</a>	-	-	50	$\mu\text{A}$
		$V_R = 650\text{ V}; T_j = 175\text{ °C};$ per diode; <a href="#">Fig. 6</a>	-	-	200	$\mu\text{A}$
<b>Dynamic characteristics</b>						
$Q_r$	recovered charge	$I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 25\text{ °C};$ per diode; <a href="#">Fig. 7</a>	-	19	-	nC
$C_d$	diode capacitance	$f = 1\text{ MHz}; V_R = 1\text{ V}; T_j = 25\text{ °C}$	-	250	-	pF
		$f = 1\text{ MHz}; V_R = 300\text{ V}; T_j = 25\text{ °C}$	-	31	-	pF
		$f = 1\text{ MHz}; V_R = 600\text{ V}; T_j = 25\text{ °C}$	-	28	-	pF
$E_{as}$	non-repetitive avalanche energy	$I_R = 4.9\text{ A}; L = 5\text{ mH}; T_{j(\text{init})} = 25\text{ °C}$	60	-	-	mJ



$V_o = 1.249\text{ V}; R_s = 0.1025\ \Omega$   
 (1)  $T_j = -55\text{ °C};$  typical values  
 (2)  $T_j = 0\text{ °C};$  typical values  
 (3)  $T_j = 25\text{ °C};$  typical values  
 (4)  $T_j = 100\text{ °C};$  typical values  
 (5)  $T_j = 150\text{ °C};$  typical values  
 (6)  $T_j = 175\text{ °C};$  typical values

**Fig. 5. Forward current as a function of forward voltage; typical values; per diode**



**Fig. 6. Reverse leakage current as a function of reverse voltage; typical value; per diode**

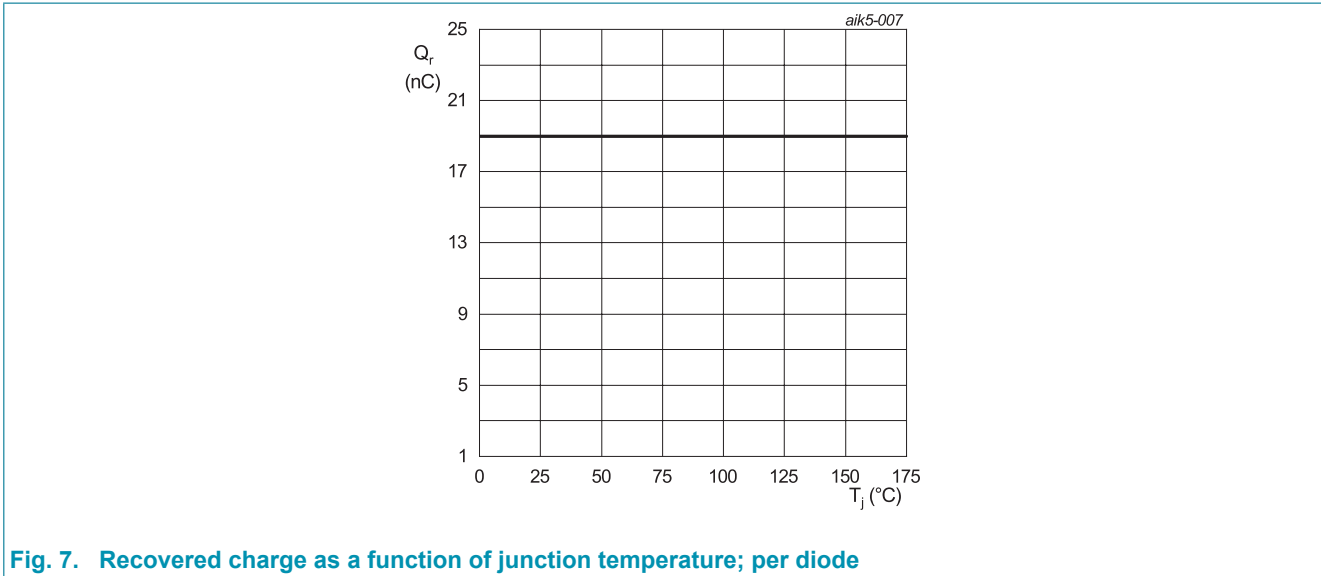
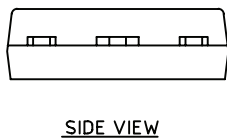
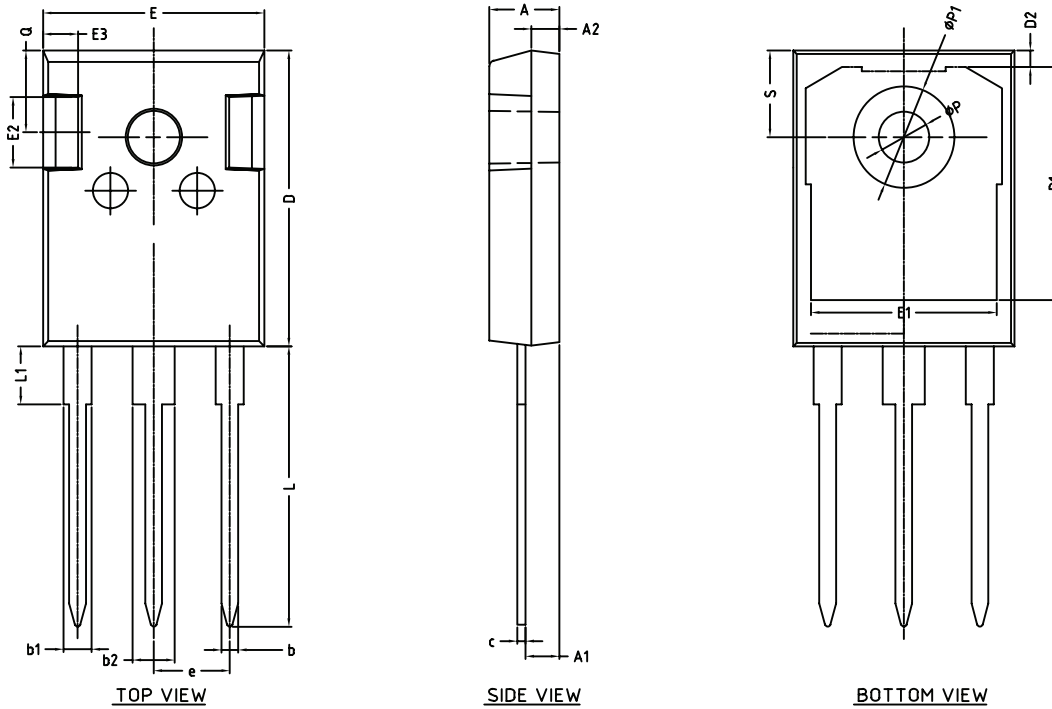


Fig. 7. Recovered charge as a function of junction temperature; per diode

### 11. Package outline

Plastic single-ended through-hole package; heatsink mounted; 1 mounting hole; 3-lead TO-247 SOT429N



UNIT	A	A1	A2	b	b1	b2	c	D	D1	D2	E	E1	E2	E3	e	L	L1	P	P1	Q	S
mm	5.20	2.60	2.10	1.40	2.20	3.20	0.70	21.10	16.85	1.35	15.90	13.50	5.20	2.60	5.45	20.10	4.75	3.70	7.40	6.00	6.25
	4.70	2.20	1.90	1.00	1.80	2.80	0.50	20.90	16.25	1.05	15.70	13.10	4.80	2.40	19.80	-	3.50	-	5.60	6.05	

OUTLINE VERSION	REFERENCES			PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ		
SOT429N		TO-247			



## 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.
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Date of release: 07 September 2020

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