

1. General description

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



2. Features and benefits

- Highly stable switching performance
- Extremely fast reverse recovery time
- Superior in efficiency to Silicon Diode alternatives
- High Forward Surge Capability I_{FSM}
- 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

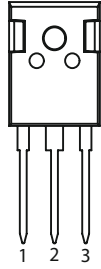
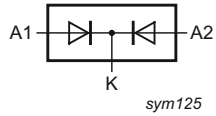
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
Absolute maximum rating						
V_{RRM}	repetitive peak reverse voltage		650			V
$I_{O(AV)}$	average forward current	$\delta = 0.5$; square-wave pulse; $T_{mb} \leq 117$ °C; both diodes conducting; Fig. 1 ; Fig. 2 ; Fig. 3	30			A
T_j	junction temperature		175			°C
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 15$ A; $T_j = 25$ °C; per diode; Fig. 5	-	1.45	1.7	V
		$I_F = 15$ A; $T_j = 150$ °C; per diode; Fig. 5	-	1.65	1.9	V
Dynamic characteristics						
Q_r	recovered charge	$I_F = 15$ A; $di_F/dt = 500$ A/ μ s; $V_R = 400$ V; $T_j = 25$ °C; per diode; Fig. 7	-	24	-	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	mb	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
WNSC2D30650CW	TO247	WNSC2D30650CWQ	Tube	30	SOT429	25-Mar-2013

7. Marking

Table 4. Marking codes

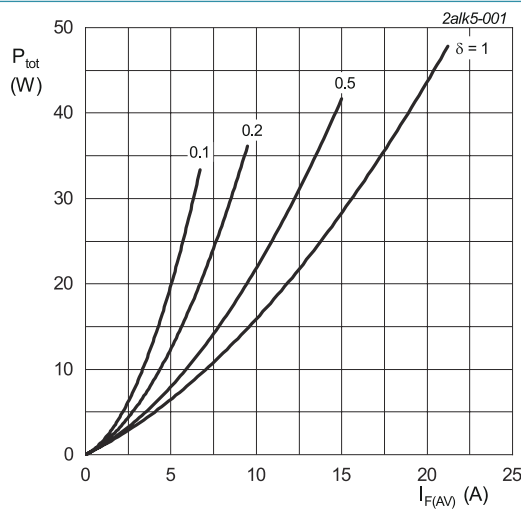
Type number	Marking codes
WNSC2D30650CW	WNSC2D 30650CW

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
$I_{O(AV)}$	average forward current	$\delta = 0.5$; square-wave pulse; $T_{mb} \leq 117\text{ }^\circ\text{C}$; both diodes conducting; Fig. 1; Fig. 2; Fig. 3	30	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 123\text{ }^\circ\text{C}$; square-wave pulse; per diode	30	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	85	A
		$t_p = 10\text{ }\mu\text{s}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; square-wave pulse; per diode	900	A
I^2t	I^2t for fusing	sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; $t_p = 10\text{ ms}$	36	A^2s
T_{stg}	storage temperature		-55 to 175	$^\circ\text{C}$
T_j	junction temperature		175	$^\circ\text{C}$



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

$$V_o = 0.997\text{ V}; R_s = 0.0593\text{ }\Omega$$

Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values; per diode

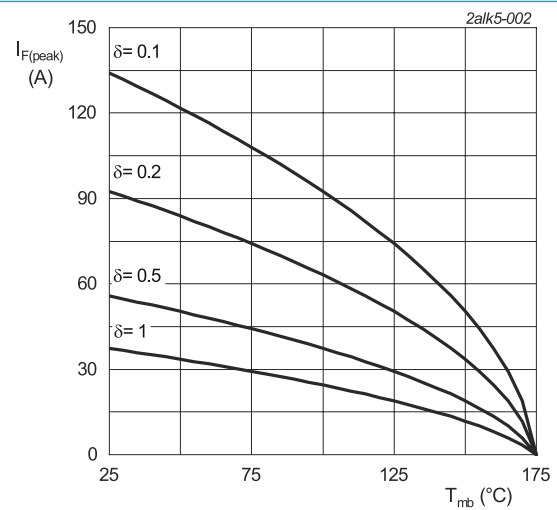


Fig. 2. Current derating as a function of mounting base temperature; per diode

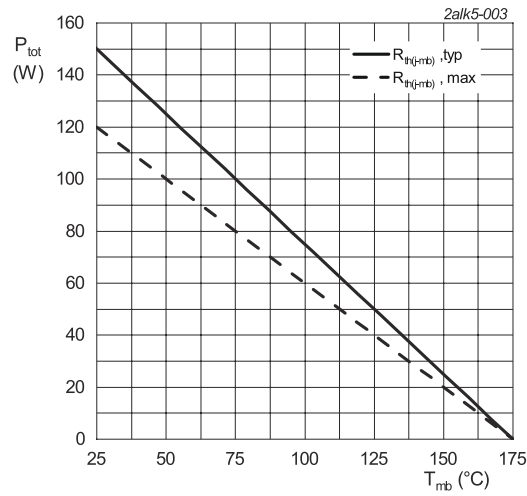


Fig. 3. Total power dissipation as a function of mounting base temperature; per diode

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; Fig. 4	-	1	1.25	K/W
		both diodes conducting	-	-	0.7	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	40	-	K/W

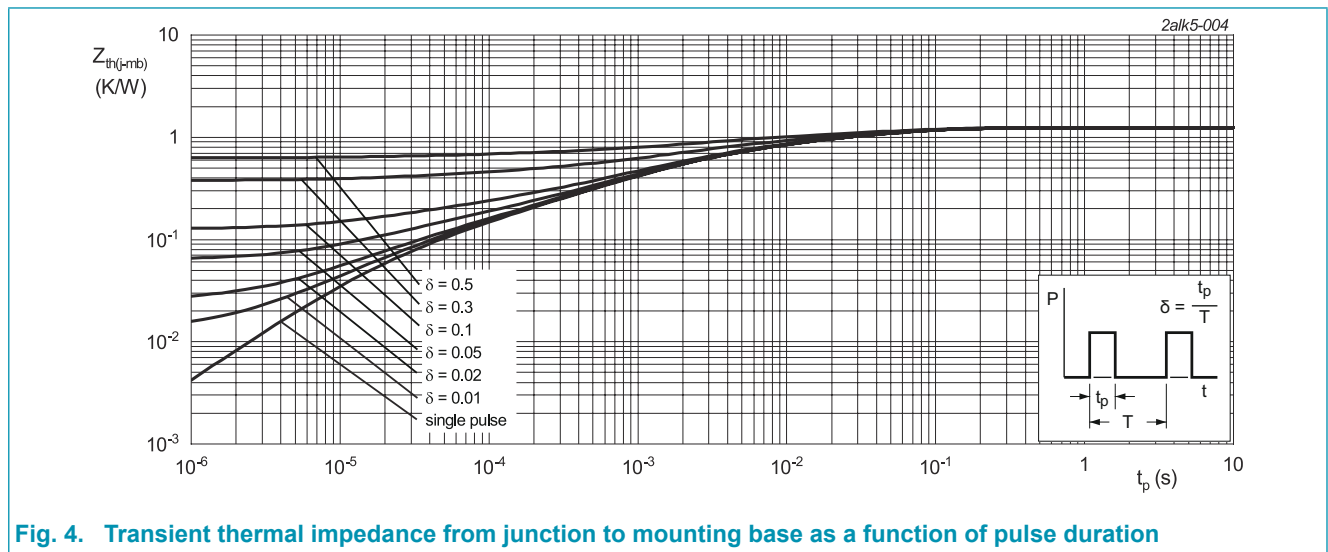
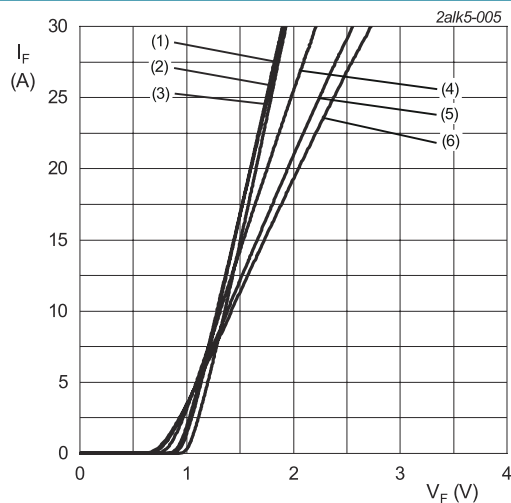


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward current	$I_F = 15\text{ A}; T_j = 25\text{ °C};$ per diode; Fig. 5	-	1.45	1.7	V
		$I_F = 15\text{ A}; T_j = 150\text{ °C};$ per diode; Fig. 5	-	1.65	1.9	V
		$I_F = 15\text{ A}; T_j = 175\text{ °C};$ per diode; Fig. 5	-	1.72	2.1	V
I_R	reverse current	$V_R = 650\text{ V}; T_j = 25\text{ °C};$ per diode; Fig. 6	-	3	50	μA
		$V_R = 650\text{ V}; T_j = 175\text{ °C};$ per diode; Fig. 6	-	18	200	μA
Dynamic characteristics						
Q_r	recovered charge	$I_F = 15\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s};$ $T_j = 25\text{ °C};$ per diode; Fig. 7	-	24	-	nC
C_d	diode capacitance	$f = 1\text{ MHz}; V_R = 1\text{ V}; T_j = 25\text{ °C};$ per diode	-	500	-	pF
		$f = 1\text{ MHz}; V_R = 300\text{ V}; T_j = 25\text{ °C};$ per diode	-	58	-	pF
		$f = 1\text{ MHz}; V_R = 600\text{ V}; T_j = 25\text{ °C};$ per diode	-	52	-	pF
E_{as}	non-repetitive avalanche energy	$I_R = 6.3\text{ A}; L = 5\text{ mH}; T_{j(\text{init})} = 25\text{ °C};$ per diode	99	-	-	mJ



$V_o = 0.997\text{ V}; R_s = 0.0593\ \Omega$
 (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

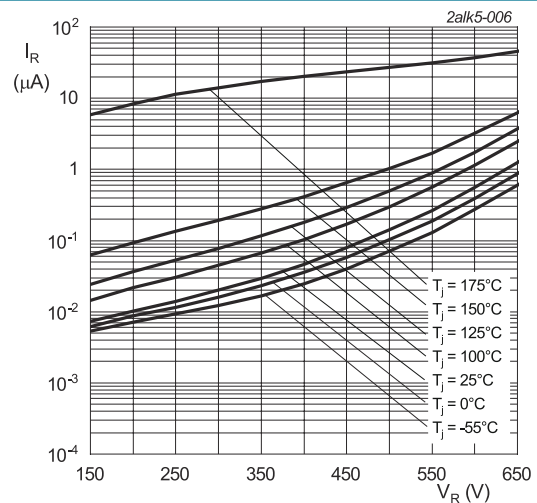
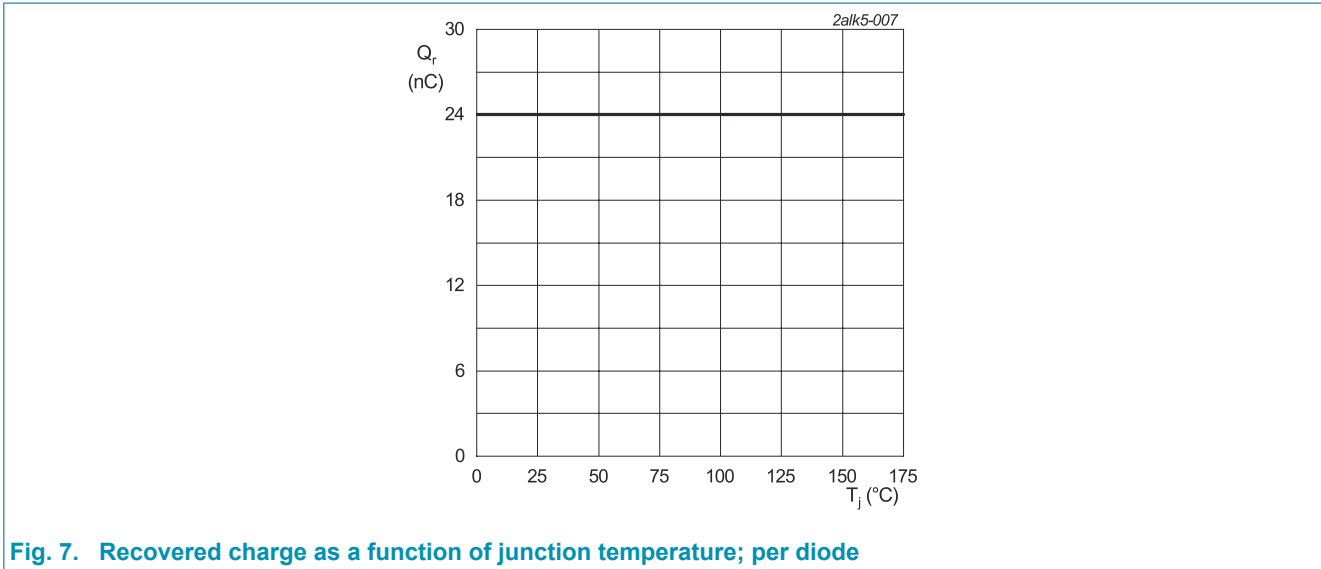


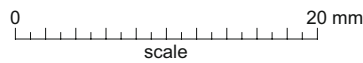
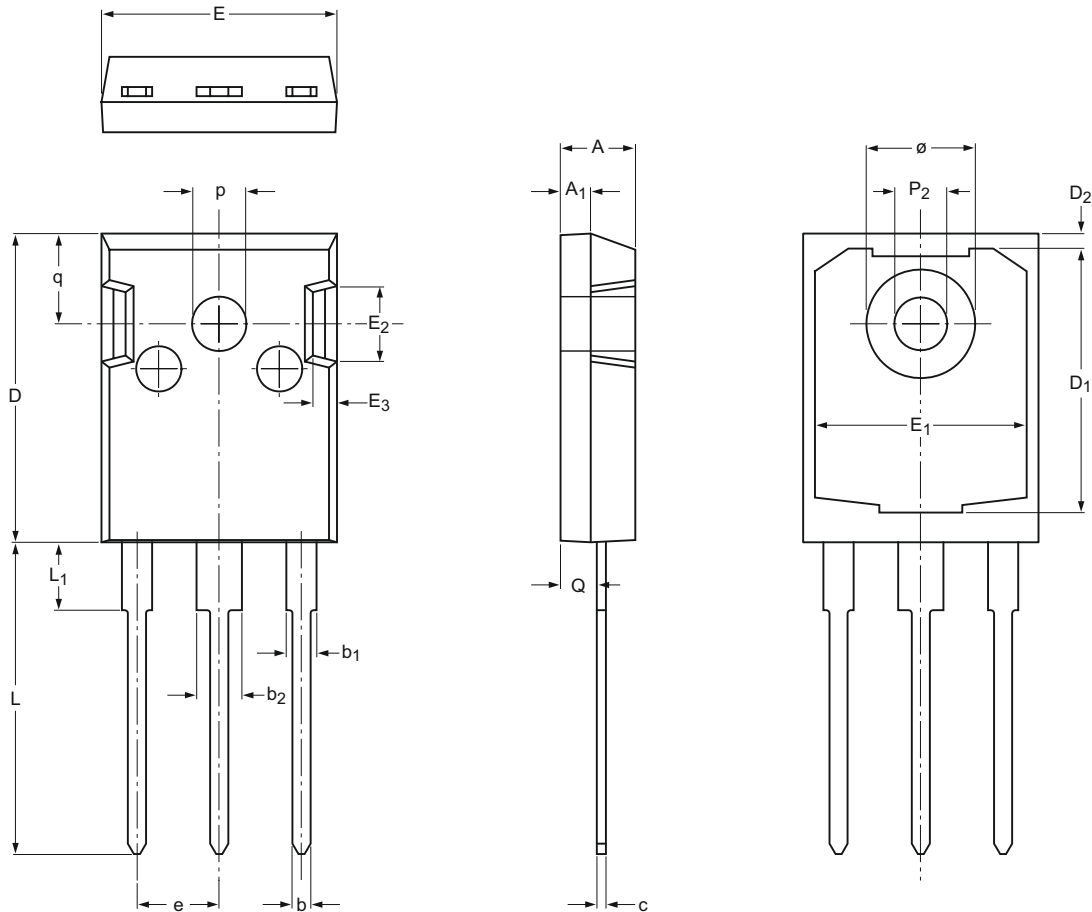
Fig. 6. Reverse leakage current as a function of reverse voltage; typical value; per diode



11. Package outline

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

SOT429



Dimensions (mm are the original dimensions)

Unit ⁽¹⁾	A	A ₁	b	b ₁	b ₂	c	D	D ₁	D ₂	E	E ₁	E ₂	E ₃	e ⁽¹⁾	L	L ₁	P ₂	p	Q	q	ø	
max	5.20	2.10	1.40	2.20	3.20	0.70	20.6	17.68	1.20	15.75	14.22	5.20	1.80		20.90	4.75	3.60	3.70	2.60	6.18	7.30	
nom														5.45								
min	4.70	1.90	1.00	1.80	2.80	0.50	20.3	17.28	0.80	15.45	13.82	4.80	1.40		20.40	4.25	3.40	3.50	2.20	5.78	7.10	

Note

1. Basic spacing between centers.

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Outline version	References			European projection	Issue date
	IEC	JEDEC	JEITA		
SOT429		TO-247			-04-09-14- 13-03-25

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.
Product [short] data sheet	Production	This document contains the product specification.

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