

## 1. General description

Silicon Carbide Schottky diode in a DFN 8\*8 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
- 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

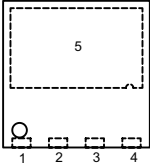
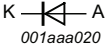
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
Absolute maximum rating							
V <sub>RRM</sub>	repetitive peak reverse voltage			650			V
I <sub>F(AV)</sub>	average forward current	δ = 0.5 ; square-wave pulse; T <sub>c</sub> ≤ 149 °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>		4			A
T <sub>j</sub>	junction temperature			-55 to 175			°C
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 4 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 5</a>		-	1.45	1.70	V
		I <sub>F</sub> = 4 A; T <sub>j</sub> = 150 °C; <a href="#">Fig. 5</a>		-	1.80	2.20	V
Dynamic characteristics							
Q <sub>r</sub>	recovered charge	I <sub>F</sub> = 4 A; dI <sub>F</sub> /dt = 500 A/μs; V <sub>R</sub> = 400 V; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a>		-	6	-	nC

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	n.c.	not connected		
2	n.c.	not connected		
3	A	anode		
4	A	anode		
5	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
WNSC5D04650T	DFN8*8	WNSC5D04650T6J	Tape	3000	DFN8X8N	25-Dec-2019

7. Marking

Table 4. Marking codes

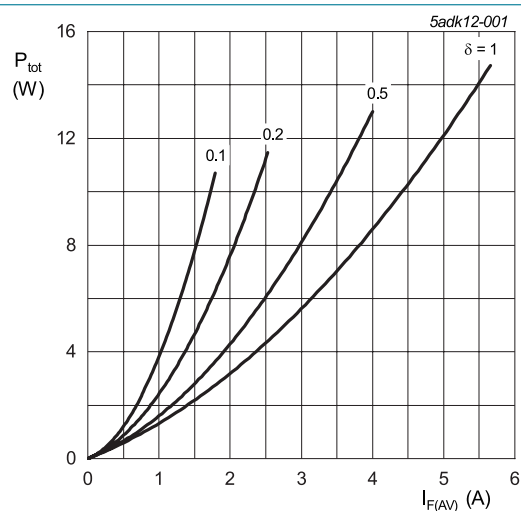
Type number	Marking codes
WNSC5D04650T	WNSC5D 04650T

## 8. Limiting values

**Table 5. Limiting values**

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

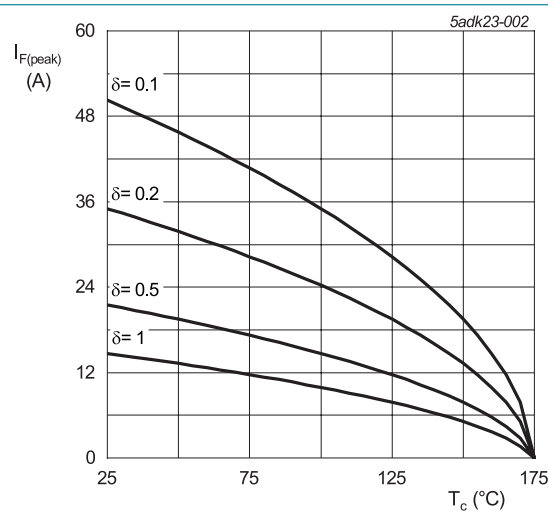
Symbol	Parameter	Conditions	Notes	Values	Unit
$V_{RRM}$	repetitive peak reverse voltage			650	V
$V_{RWM}$	crest working reverse voltage			650	V
$V_R$	reverse voltage	DC		650	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; $T_c \leq 149\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>		4	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_c \leq 149\text{ }^{\circ}\text{C}$ ; square-wave pulse		8	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		28	A
		$t_p = 10\text{ }\mu\text{s}$ ; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; square-wave pulse		290	A
$I^2t$	$I^2t$ for fusing	sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; $t_p = 10\text{ ms}$		3.92	$\text{A}^2\text{s}$
$T_{stg}$	storage temperature			-55 to 175	$^{\circ}\text{C}$
$T_j$	junction temperature			-55 to 175	$^{\circ}\text{C}$



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

$$V_o = 1.044\text{ V}; R_s = 0.2758\text{ }\Omega$$

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



**Fig. 2. Current derating as a function of case temperature**

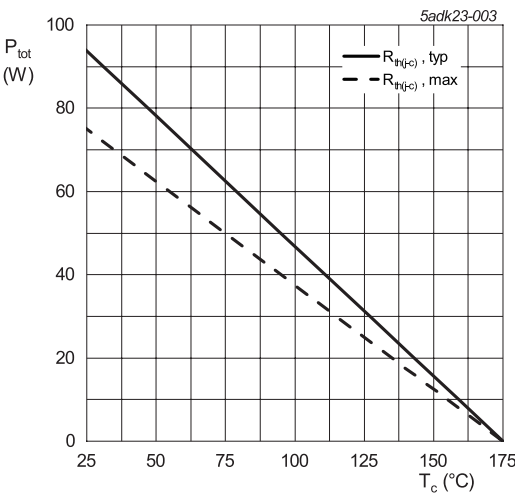


Fig. 3. Total power dissipation as a function of case temperature

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$R_{th(j-c)}$	thermal resistance from junction to case	<a href="#">Fig. 4</a>		-	1.6	2	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	50	-	K/W

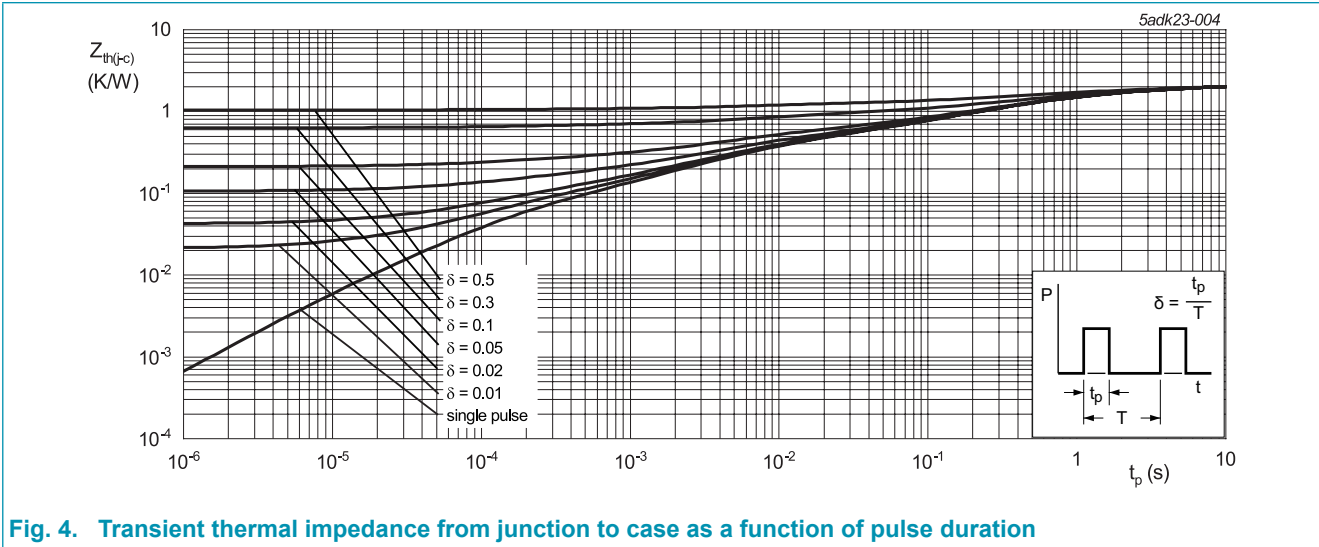
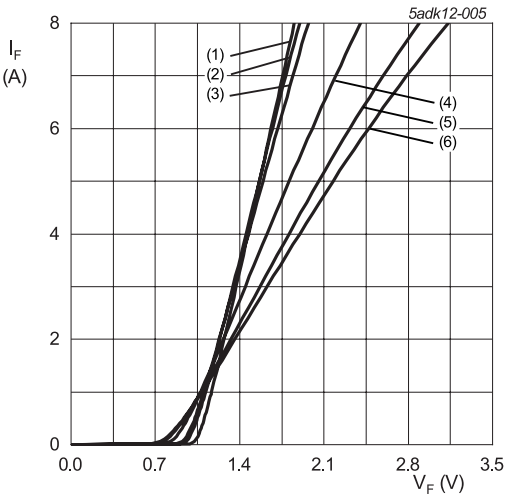


Fig. 4. Transient thermal impedance from junction to case as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V <sub>F</sub>	forward current	I <sub>F</sub> = 4 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 5</a>		-	1.45	1.70	V
		I <sub>F</sub> = 4 A; T <sub>j</sub> = 150 °C; <a href="#">Fig. 5</a>		-	1.80	2.20	V
		I <sub>F</sub> = 4 A; T <sub>j</sub> = 175 °C; <a href="#">Fig. 5</a>		-	2.00	2.30	V
I <sub>R</sub>	reverse current	V <sub>R</sub> = 650 V; T <sub>j</sub> = 25 °C; <a href="#">Fig. 6</a>		-	0.2	20	μA
		V <sub>R</sub> = 650 V; T <sub>j</sub> = 175 °C; <a href="#">Fig. 6</a>		-	10	100	μA
Dynamic characteristics							
Q <sub>r</sub>	recovered charge	I <sub>F</sub> = 4 A; V <sub>R</sub> = 400 V; dI <sub>F</sub> /dt = 500 A/μs; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a>		-	6	-	nC
C <sub>d</sub>	diode capacitance	f = 1 MHz; V <sub>R</sub> = 1 V; T <sub>j</sub> = 25 °C		-	138	-	pF
		f = 1 MHz; V <sub>R</sub> = 300 V; T <sub>j</sub> = 25 °C		-	17	-	pF
		f = 1 MHz; V <sub>R</sub> = 600 V; T <sub>j</sub> = 25 °C		-	15	-	pF
E <sub>as</sub>	non-repetitive avalanche energy	I <sub>R</sub> = 2.8 A; L = 5 mH; T <sub>j(init)</sub> = 25 °C		20	-	-	mJ



V<sub>0</sub> = 1.044 V; R<sub>s</sub> = 0.2758 Ω  
(1) T<sub>J</sub> = -55 °C; typical values  
(2) T<sub>J</sub> = 0 °C; typical values  
(3) T<sub>J</sub> = 25 °C; typical values  
(4) T<sub>J</sub> = 100 °C; typical values  
(5) T<sub>J</sub> = 150 °C; typical values  
(6) T<sub>J</sub> = 175 °C; typical values

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

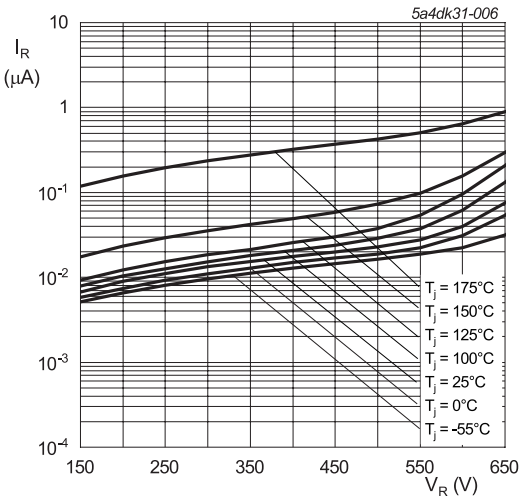


Fig. 6. Reverse leakage current as a function of reverse voltage; typical value

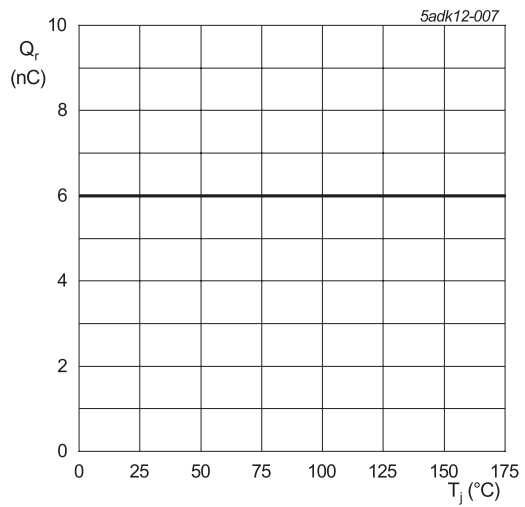
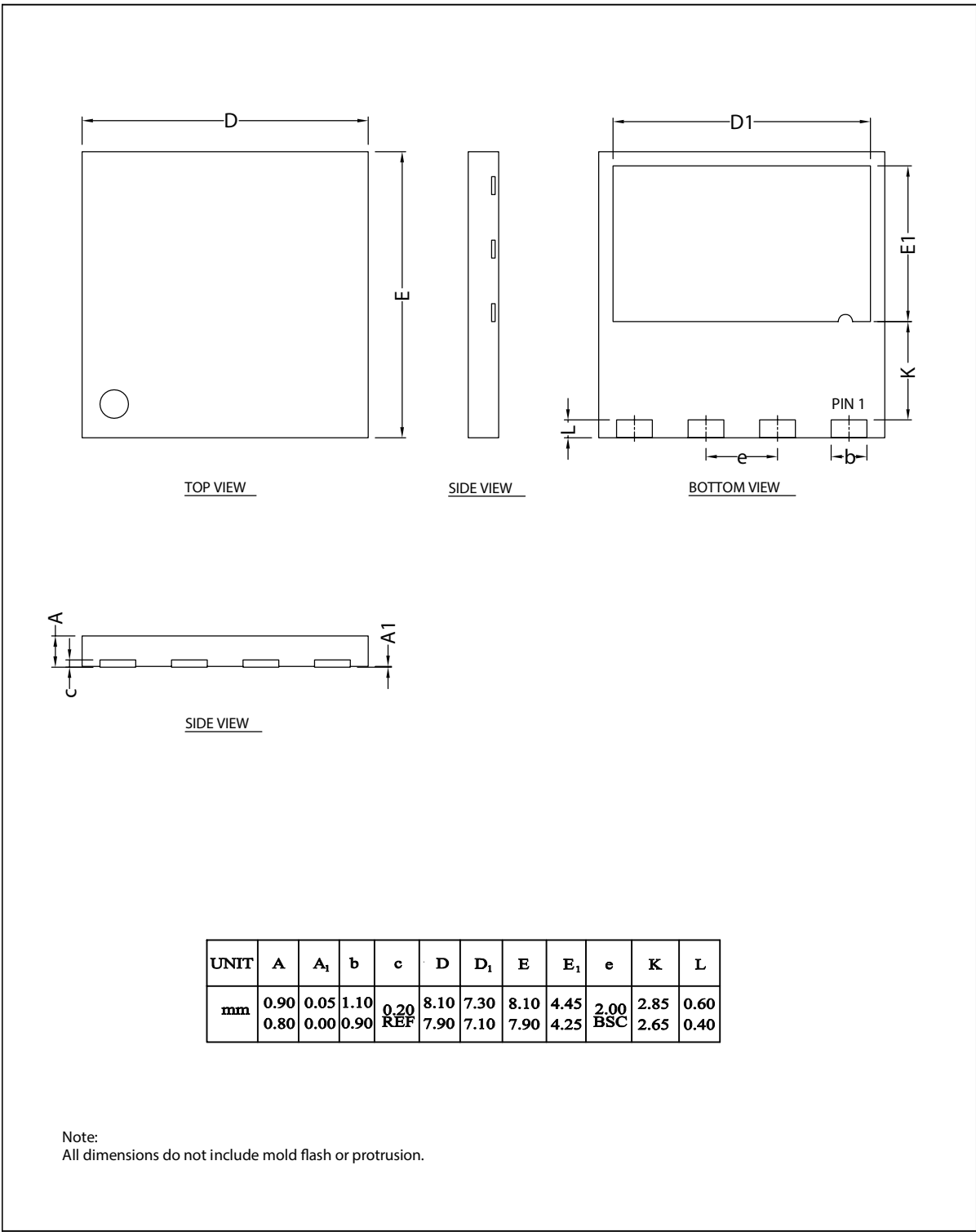


Fig. 7. Recovered charge as a function of junction temperature

11. Package outline





## 12. Legal information

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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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