WNSC08650T

Silicon Carbide Diode

Rev.01 - 18 March 2020 Product data sheet

1. General description

Silicon Carbide Schottky diode in a DFN 8*8 plastic package, designed for high frequency switched-mode power supplies.

RoHS Halogen-Free Lead-Free

2. Features and benefits

- Highly stable switching performance
- High forward surge capability IFSM
- 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

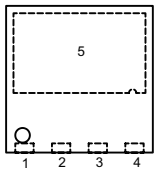
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values				Unit
Absolute maximum rating							
V_{RRM}	repetitive peak reverse voltage		650				V
$I_{F(AV)}$	average forward current	δ = 0.5 ; square-wave pulse; $T_c \leq 136$ °C; Fig. 1; Fig. 2; Fig. 3	8				A
T_j	junction temperature		175				°C
Symbol	**Parameter**	**Conditions**		**Min**	**Typ**	**Max**	**Unit**
Static characteristics							
V_F	forward voltage	I_F = 8 A; T_j = 25 °C; Fig. 5		-	1.5	1.7	V
		I_F = 8 A; T_j = 150 °C; Fig. 5		-	1.8	2.1	V
Dynamic characteristics							
Q_r	recovered charge	I_F = 8 A; dI_F/dt = 500 A/µs; V_R = 400 V; T_j = 25 °C; Fig. 7		-	13	-	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
WNSC08650T	DFN8*8	WNSC08650T6J	Tape	3000	DFN8X8N	25-Dec-2019

7. Marking

Table 4. Marking codes

Type number	Marking codes
WNSC08650T	WNSC 08650T

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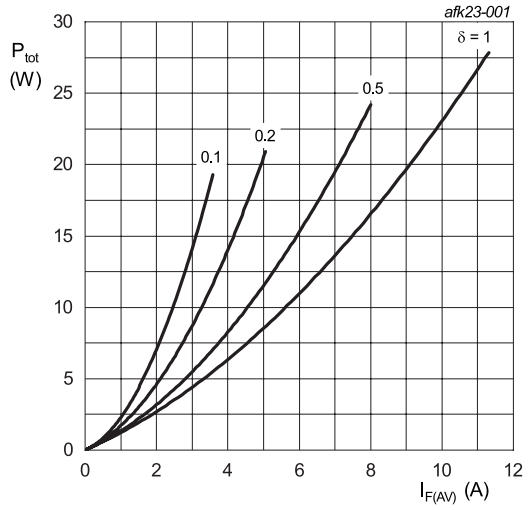
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8. Limiting values

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
$I_{F(AV)}$	average forward current	δ = 0.5; square-wave pulse; $T_c \leq 136$ °C; Fig. 1; Fig. 2; Fig. 3	8	A
I_{FRM}	repetitive peak forward current	δ = 0.5; t_p = 25 µs; $T_c \leq 153$ °C; square-wave pulse	16	A
I_{FSM}	non-repetitive peak forward current	t_p = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse	48	A
		t_p = 10 µs; $T_{j(init)}$ = 25 °C; square-wave pulse	385	A
I^2t	I^2t for fusing	sine-wave pulse; $T_{j(init)}$ = 25 °C; t_p = 10 ms	12	A^2s
T_{stg}	storage temperature		-55 to 175	°C
T_j	junction temperature		175	°C



$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$
V_o = 1.108 V; R_s = 0.1198 Ω

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

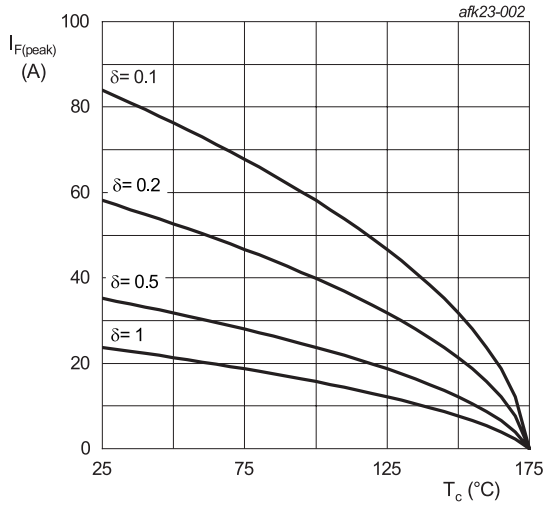


Fig. 2. Current derating as a function of case temperature

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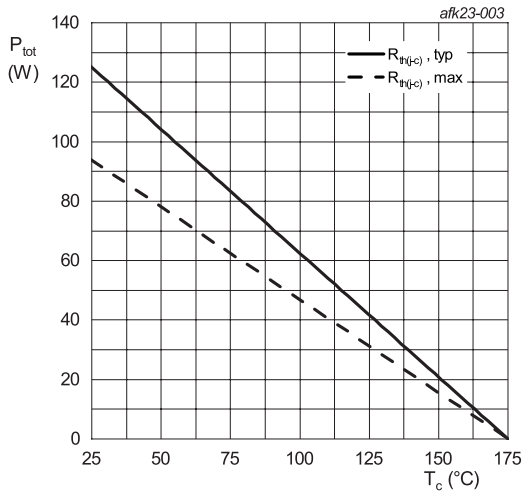


Fig. 3. Total power dissipation as a function of case temperature

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9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-c)}$	thermal resistance from junction to case	Fig. 4		-	1.2	1.6	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	50	-	K/W

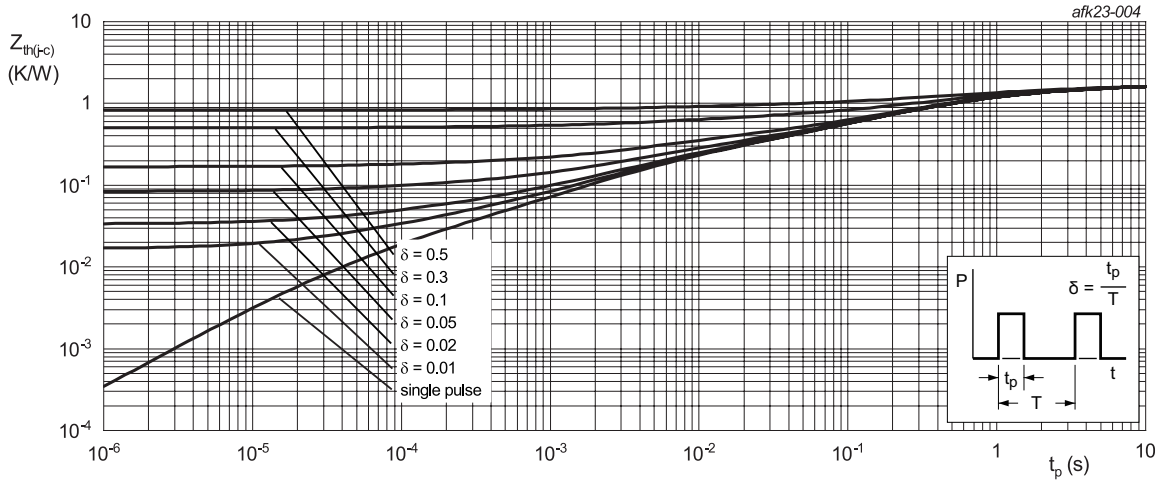


Fig. 4. Transient thermal impedance from junction to case as a function of pulse duration

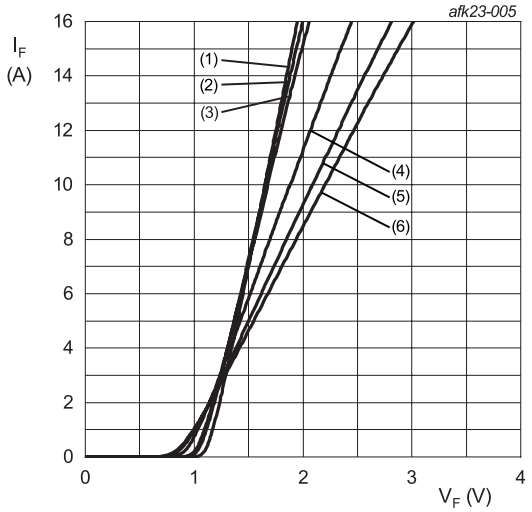
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10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V_F	forward current	I_F = 8 A; T_j = 25 °C; Fig. 5		-	1.5	1.7	V
		I_F = 8 A; T_j = 150 °C; Fig. 5		-	1.8	2.1	V
		I_F = 8 A; T_j = 175 °C; Fig. 5			1.95	2.25	V
I_R	reverse current	V_R = 650 V; T_j = 25 °C; Fig. 6		-		50	µA
		V_R = 650 V; T_j = 175 °C; Fig. 6		-		200	µA
Dynamic characteristics							
Q_r	recovered charge	I_F = 8 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 25 °C; Fig. 7		-	13	-	nC
C_d	diode capacitance	f = 1 MHz; V_R = 1 V; T_j = 25 °C		-	267	-	pF
		f = 1 MHz; V_R = 300 V; T_j = 25 °C		-	37	-	pF
		f = 1 MHz; V_R = 600 V; T_j = 25 °C		-	36	-	pF
E_{as}	non-repetitive avalanche energy	I_R = 4.9 A; L = 5 mH; $T_{j(init)}$ = 25 °C		60	-	-	mJ



V_o = 1.108 V; R_s = 0.1198 Ω
(1) T_j = -55 °C; typical values
(2) T_j = 0 °C; typical values
(3) T_j = 25 °C; typical values
(4) T_j = 100 °C; typical values
(5) T_j = 150 °C; typical values
(6) T_j = 175 °C; typical values

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

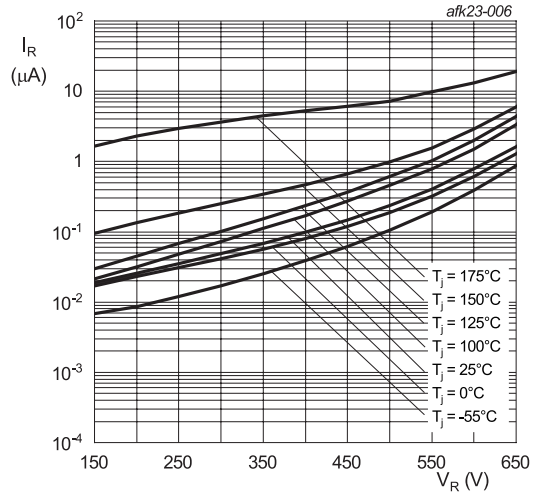


Fig. 6. Reverse leakage current as a function of reverse voltage; typical value

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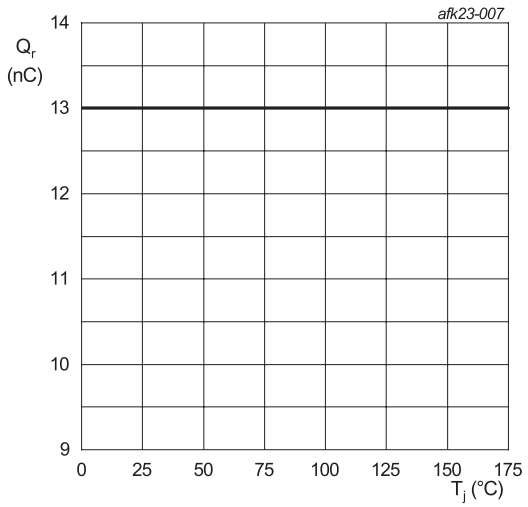
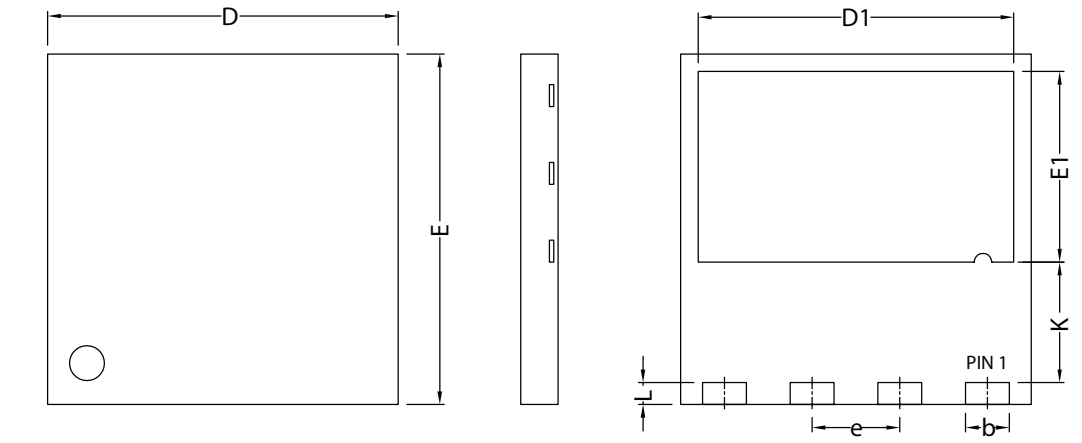


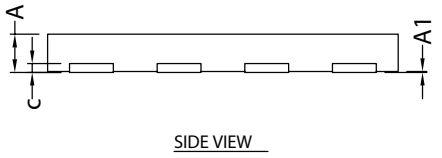
Fig. 7. Recovered charge as a function of junction temperature

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11. Package outline





UNIT	A	A_1	b	c	D	D_1	E	E_1	e	K	L
mm	0.90 0.80	0.05 0.00	1.10 0.90	0.20 REF	8.10 7.90	7.30 7.10	8.10 7.90	4.45 4.25	2.00 BSC	2.85 2.65	0.60 0.40

Note:
All dimensions do not include mold flash or protrusion.

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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.
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