WNSC5D12650T

Silicon Carbide Diode

Rev.01 - 06 December 2022 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
- 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

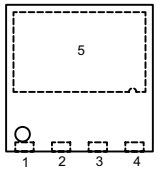
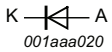
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
Absolute maximum rating							
V_{RRM}	repetitive peak reverse voltage			650			V
$I_{F(AV)}$	average forward current	δ = 0.5 ; square-wave pulse; $T_c \leq 142$ °C; Fig. 1; Fig. 2; Fig. 3		12			A
T_j	junction temperature			-55 to 175			°C
Symbol	**Parameter**	**Conditions**	**Notes**	**Min**	**Typ**	**Max**	**Unit**
Static characteristics							
V_F	forward voltage	I_F = 12 A; T_j = 25 °C; Fig. 5		-	1.45	1.70	V
		I_F = 12 A; T_j = 150 °C; Fig. 5		-	1.80	2.20	V
Dynamic characteristics							
Q_r	recovered charge	I_F = 12 A; dI_F/dt = 500 A/µs; V_R = 400 V; T_j = 25 °C; Fig. 7		-	18	-	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
WNSC5D12650T	DFN8*8	WNSC5D12650T6J	Tape	3000	DFN8X8N	25-Dec-2019

7. Marking

Table 4. Marking codes

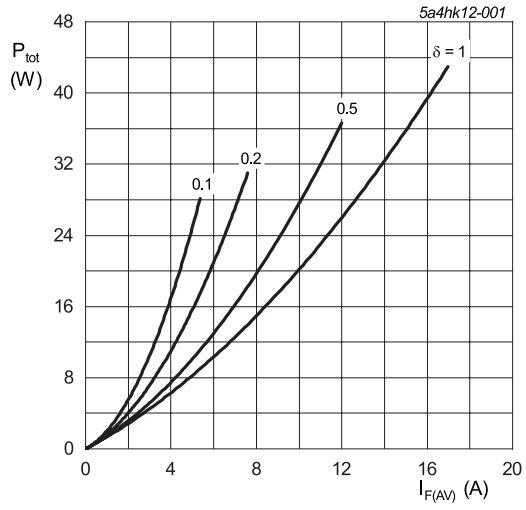
Type number	Marking codes
WNSC5D12650T	WNSC5D 12650T

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	δ = 0.5; square-wave pulse; $T_c \leq 142$ °C; Fig. 1; Fig. 2; Fig. 3		12	A
I_{FRM}	repetitive peak forward current	δ = 0.5; t_p = 25 µs; $T_c \leq 142$ °C; square-wave pulse		24	A
I_{FSM}	non-repetitive peak forward current	t_p = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse		55	A
		t_p = 10 µs; $T_{j(init)}$ = 25 °C; square-wave pulse		640	A
I^2t	I^2t for fusing	sine-wave pulse; $T_{j(init)}$ = 25 °C; t_p = 10 ms		15.125	A^2s
T_{stg}	storage temperature			-55 to 175	°C
T_j	junction temperature			-55 to 175	°C



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

V_o = 1.277 V; R_s = 0.0740 Ω

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

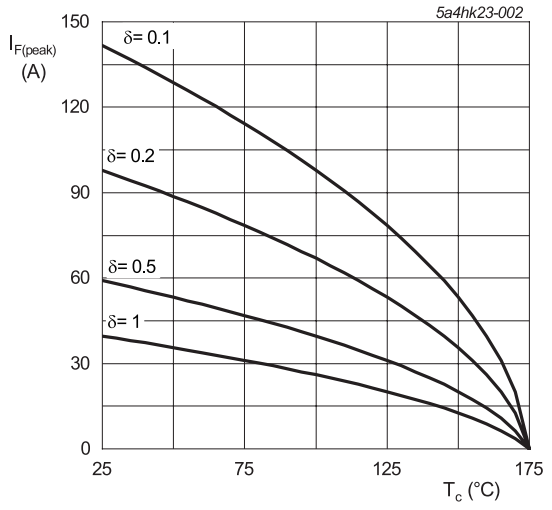


Fig. 2. Current derating as a function of case temperature

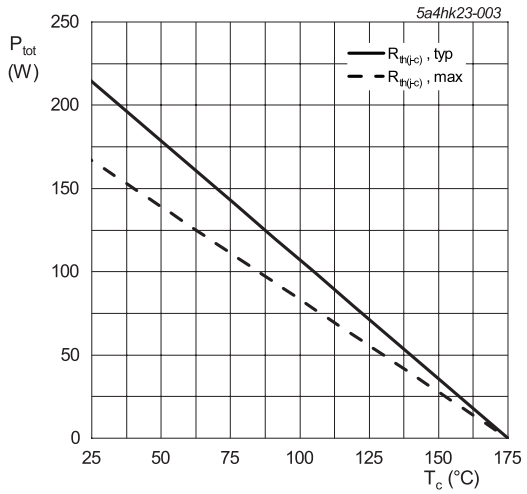


Fig. 3. Total power dissipation as a function of case temperature

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	Fig. 4		-	0.7	0.9	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	60	-	K/W

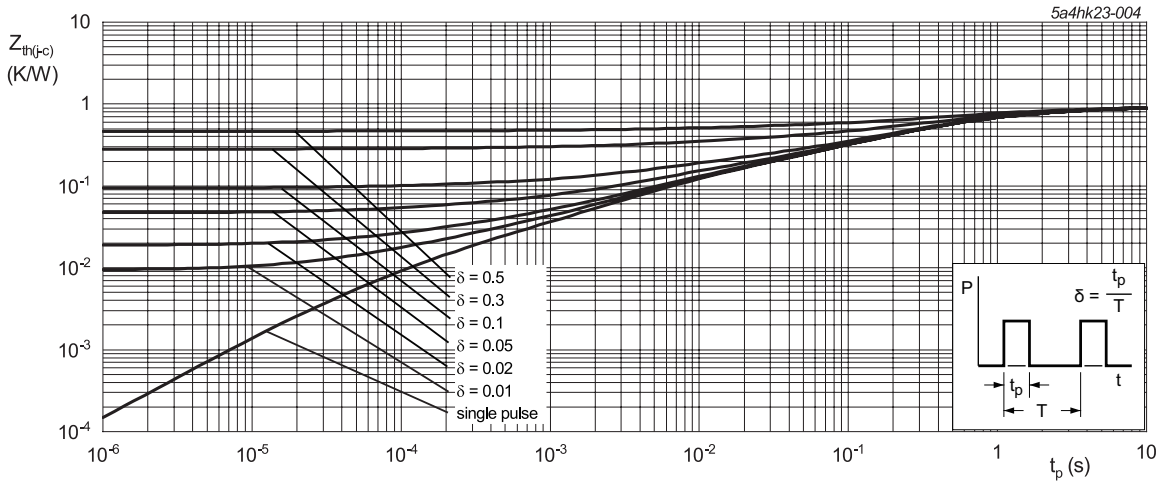
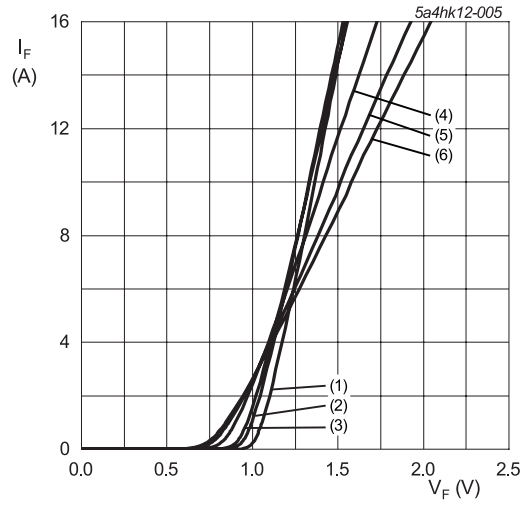


Fig. 4. Transient thermal impedance from junction to case as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V_F	forward current	I_F = 12 A; T_j = 25 °C; Fig. 5		-	1.45	1.70	V
		I_F = 12 A; T_j = 150 °C; Fig. 5		-	1.80	2.20	V
		I_F = 12 A; T_j = 175 °C; Fig. 5		-	2.00	2.30	V
I_R	reverse current	V_R = 650 V; T_j = 25 °C; Fig. 6		-	0.6	60	µA
		V_R = 650 V; T_j = 175 °C; Fig. 6		-	30	300	µA
Dynamic characteristics							
Q_r	recovered charge	I_F = 12 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 25 °C; Fig. 7		-	18	-	nC
C_d	diode capacitance	f = 1 MHz; V_R = 1 V; T_j = 25 °C		-	420	-	pF
		f = 1 MHz; V_R = 300 V; T_j = 25 °C		-	45	-	pF
		f = 1 MHz; V_R = 600 V; T_j = 25 °C		-	42	-	pF
E_{as}	non-repetitive avalanche energy	I_R = 4.5 A; L = 5 mH; $T_{j(init)}$ = 25 °C		50	-	-	mJ



V_o = 1.277 V; R_s = 0.0740 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

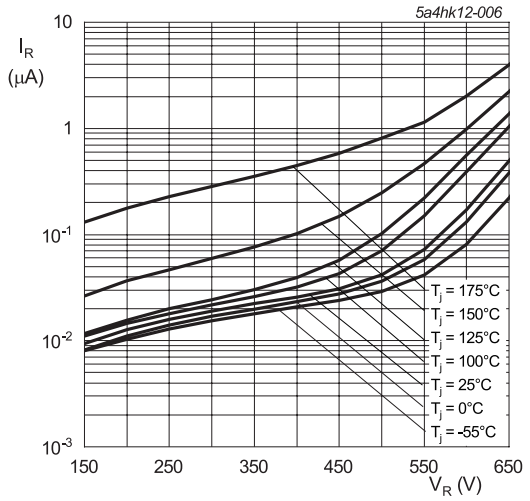


Fig. 6. Reverse leakage current as a function of reverse voltage; typical value

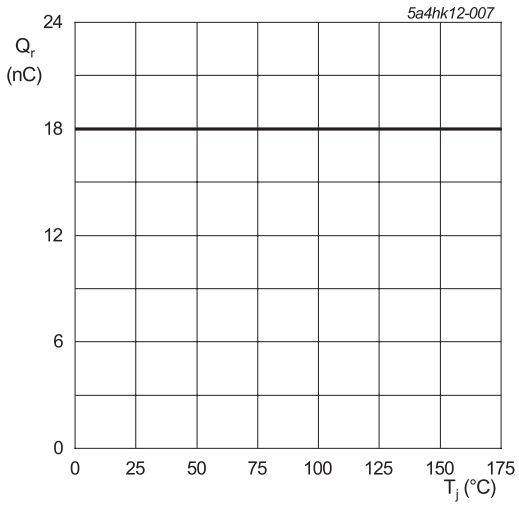
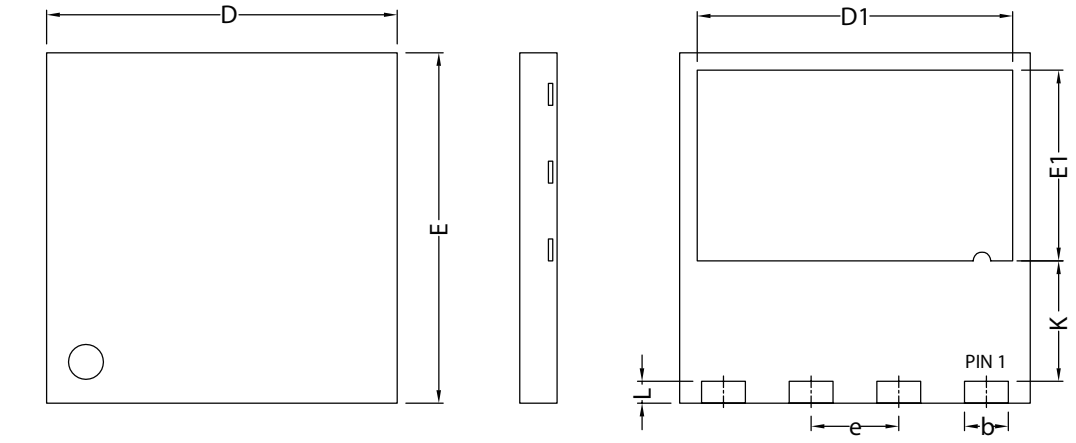
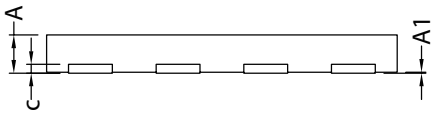


Fig. 7. Recovered charge as a function of junction temperature

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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