

1. General description

Silicon Carbide Schottky diode in a TSPAK plastic package, featured with top side cooling structure, designed for high frequency, high efficiency systems.



2. Features and benefits

- Top side cooling structure
- 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
- High junction operating temperature capability ($T_J(\max) = 175\text{ }^{\circ}\text{C}$)



3. Applications

- Switching mode power supplies
- UPS & energy storage systems
- PV inverter and MPPT circuit
- Battery formation systems
- EV chargers
- 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		1200				V
I _F	continuous forward current	T _{mb} ≤ 118 °C, DC; Fig. 2	40				A
T _j	junction temperature		175				°C
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V _F	forward voltage	I _F = 40 A; T _j = 25 °C; Fig. 5		-	1.42	1.60	V
		I _F = 40 A; T _j = 150 °C; Fig. 5		-	1.90	2.30	V
Dynamic characteristics							
Q _r	recovered charge	I _F = 40 A; dI _F /dt = 500 A/μs; V _R = 400 V; T _j = 25 °C; Fig. 7		-	99	-	nC

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1-2	n.c	n.c		
3-7	A	anode		
8-9 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
WNSC2D401200TB	TSPAK	WNSC2D401200TB6J	Reel	600	TSPAKH	06-Dec-2024

7. Marking

Table 4. Marking codes

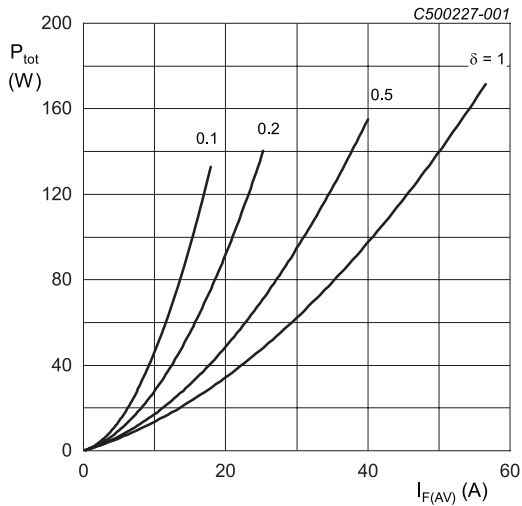
Type number	Marking codes
WNSC2D401200TB	WNSC2D 401200TB

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			1200	V
V_{RWM}	crest working reverse voltage			1200	V
V_R	reverse voltage	DC		1200	V
I_F	continuous forward current	$T_{mb} \leq 118\text{ }^{\circ}\text{C}$, DC;Fig. 2		40	A
		$T_{mb} \leq 125\text{ }^{\circ}\text{C}$, DC;Fig. 2		37	A
		$T_{mb} \leq 25\text{ }^{\circ}\text{C}$, DC;Fig. 2		72	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 125\text{ }^{\circ}\text{C}$; square-wave pulse		57	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		300	A
		$t_p = 10\text{ }\mu\text{s}$; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; square-wave pulse		1600	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; SIN		450	A^2s
T_{stg}	storage temperature			-55 to 175	$^{\circ}\text{C}$
T_j	junction temperature			-55 to 175	$^{\circ}\text{C}$



$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$
 $V_o = 0.995\text{ V}$; $R_s = 0.0360\text{ }\Omega$

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

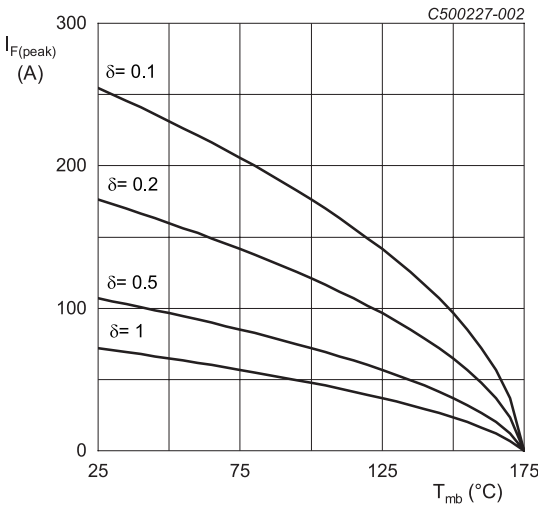


Fig. 2. Current derating as a function of mounting base temperature

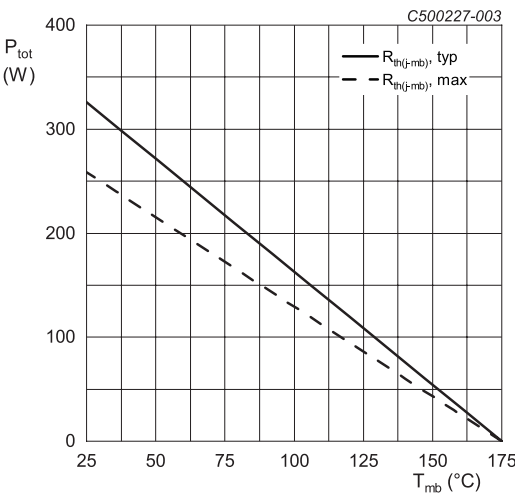


Fig. 3. Total power dissipation as a function of mounting base temperature

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	Fig. 4		-	0.46	0.58	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	60	-	K/W

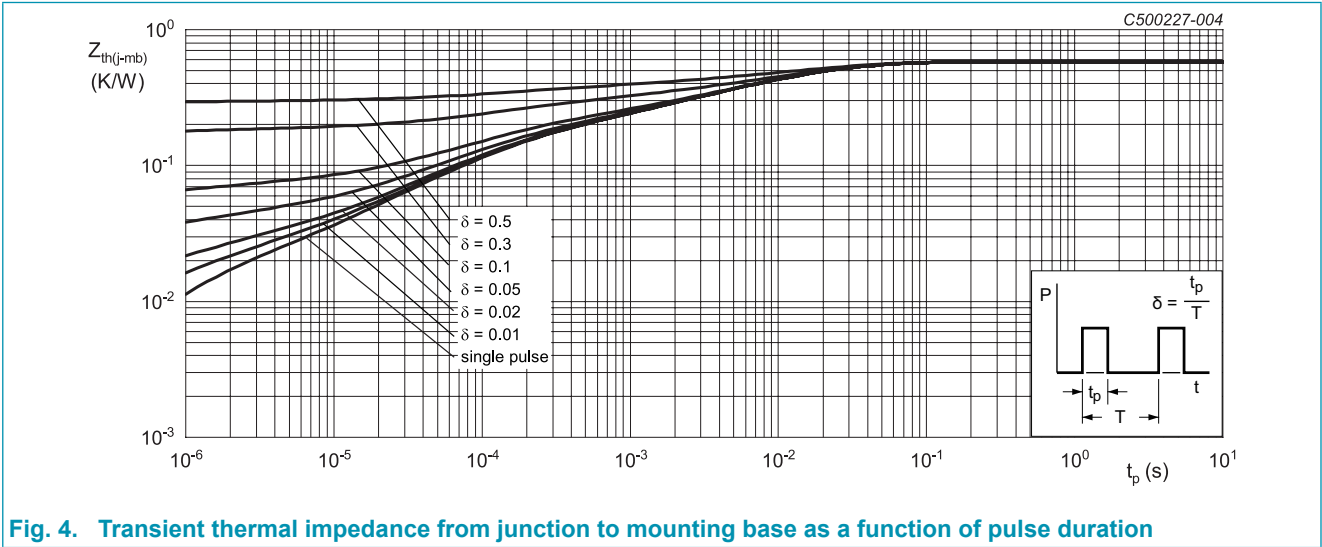
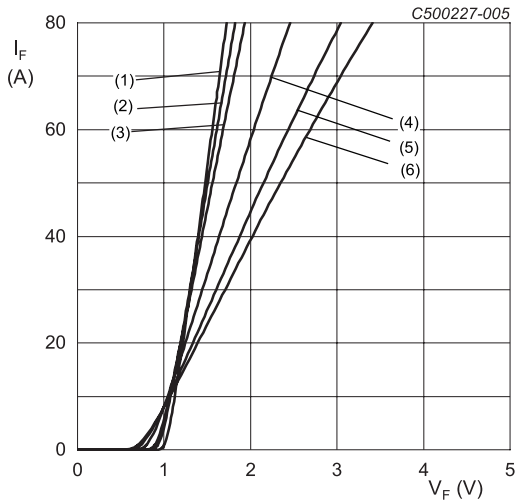


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V _F	forward voltage	I _F = 40 A; T _J = 25 °C; Fig. 5		-	1.42	1.60	V
		I _F = 40 A; T _J = 150 °C; Fig. 5		-	1.90	2.30	V
		I _F = 40 A; T _J = 175 °C; Fig. 5		-	2.00	2.50	V
I _R	reverse current	V _R = 1200 V; T _J = 25 °C; Fig. 6		-	1	200	μA
		V _R = 1200 V; T _J = 175 °C; Fig. 6		-	50	-	μA
Dynamic characteristics							
Q _r	recovered charge	I _F = 40 A; V _R = 400 V; dI _F /dt = 500 A/μs; T _J = 25 °C; Fig. 7		-	99	-	nC
C _d	diode capacitance	f = 1 MHz; V _R = 1 V; T _J = 25 °C		-	2068	-	pF
		f = 1 MHz; V _R = 400 V; T _J = 25 °C		-	175	-	pF
		f = 1 MHz; V _R = 800 V; T _J = 25 °C		-	126	-	pF
E _{as}	non-repetitive avalanche energy	I _R = 10 A; L = 10 mH; T _J (init) = 25 °C		465	-	-	mJ



V₀ = 0.995 V; R_s = 0.0360 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

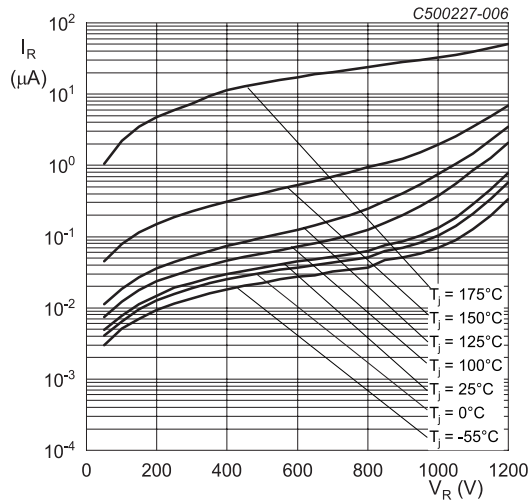


Fig. 6. Reverse leakage current as a function of reverse voltage; typical value

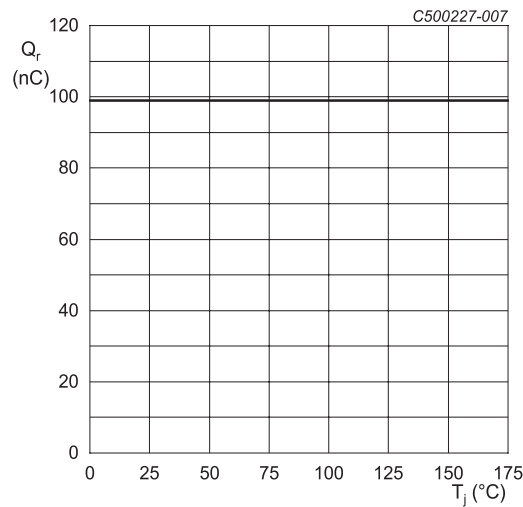


Fig. 7. Recovered charge as a function of junction temperature

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.
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- [2] The term 'short data sheet' is explained in section "Definitions".
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