

1. General description

Silicon Carbide Schottky diode in a SMB 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

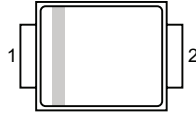
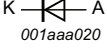
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
Absolute maximum rating						
V_{RRM}	repetitive peak reverse voltage		650			V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; square-wave pulse; $T_{lead} \leq 150$ °C; Fig. 1 ; Fig. 2 ; Fig. 3	1			A
T_j	junction temperature		175			°C
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 1$ A; $T_j = 25$ °C; Fig. 5	-	1.15	1.4	V
		$I_F = 1$ A; $T_j = 150$ °C; Fig. 5	-	1.15	1.4	V
Dynamic characteristics						
Q_r	recovered charge	$I_F = 1$ A; $dI_F/dt = 500$ A/ μ s; $V_R = 400$ V; $T_j = 25$ °C; Fig. 7	-	10	-	nC

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode		
2	A	anode		

6. Ordering information

Table 3. Ordering information

Type number	Package name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
WNSC6D01650MB	SMB	WNSC6D01650MBJ	Reel	3000	SMB	20-Feb-2017

7. Marking

Table 4. Marking codes

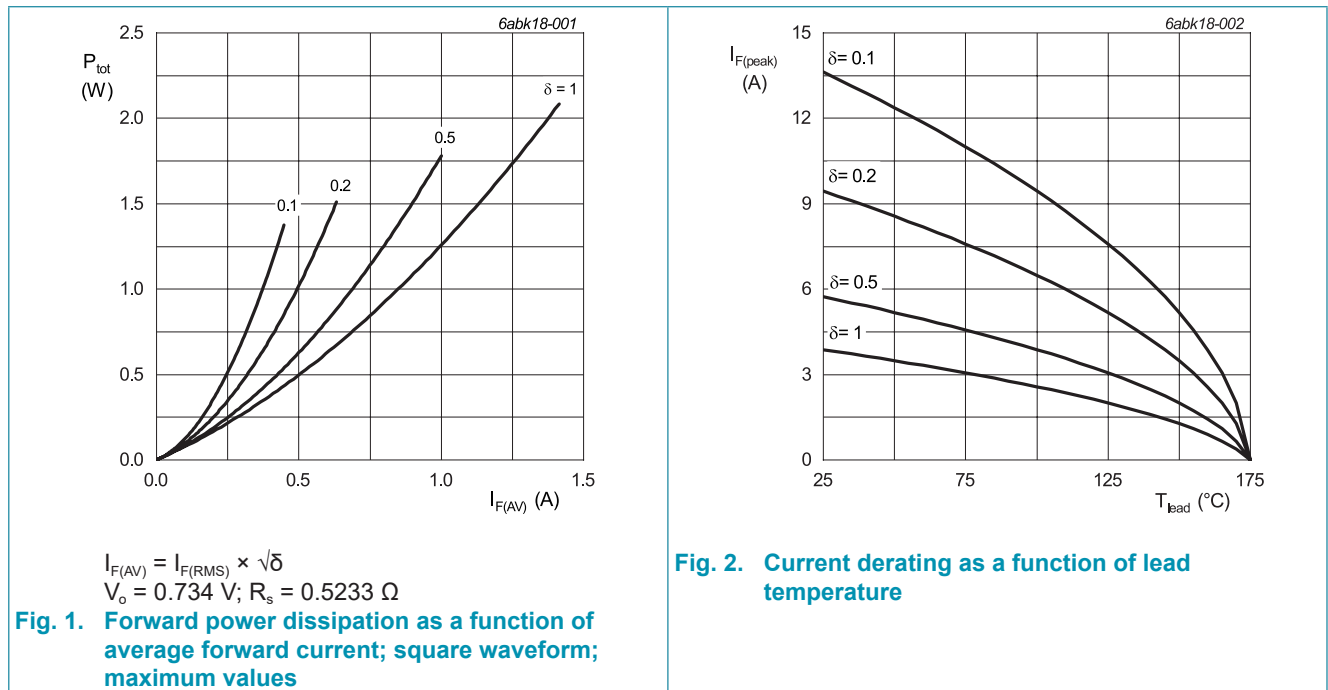
Type number	Marking codes
WNSC6D01650MB	6165ES

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	$\delta = 0.5$; square-wave pulse; $T_{lead} \leq 150\text{ }^\circ\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3	1	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{lead} \leq 150\text{ }^\circ\text{C}$; square-wave pulse	2	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	18	A
		$t_p = 10\text{ }\mu\text{s}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; square-wave pulse	235	A
I^2t	I^2t for fusing	sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; $t_p = 10\text{ ms}$	1.62	A^2s
T_{stg}	storage temperature		-55 to 175	$^\circ\text{C}$
T_j	junction temperature		175	$^\circ\text{C}$



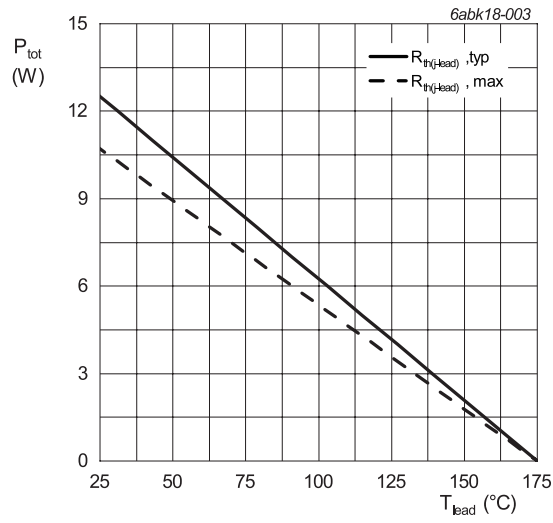


Fig. 3. Total power dissipation as a function of lead temperature

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-lead)}$	thermal resistance from junction to lead	Fig. 4	-	12	14	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	90	-	K/W

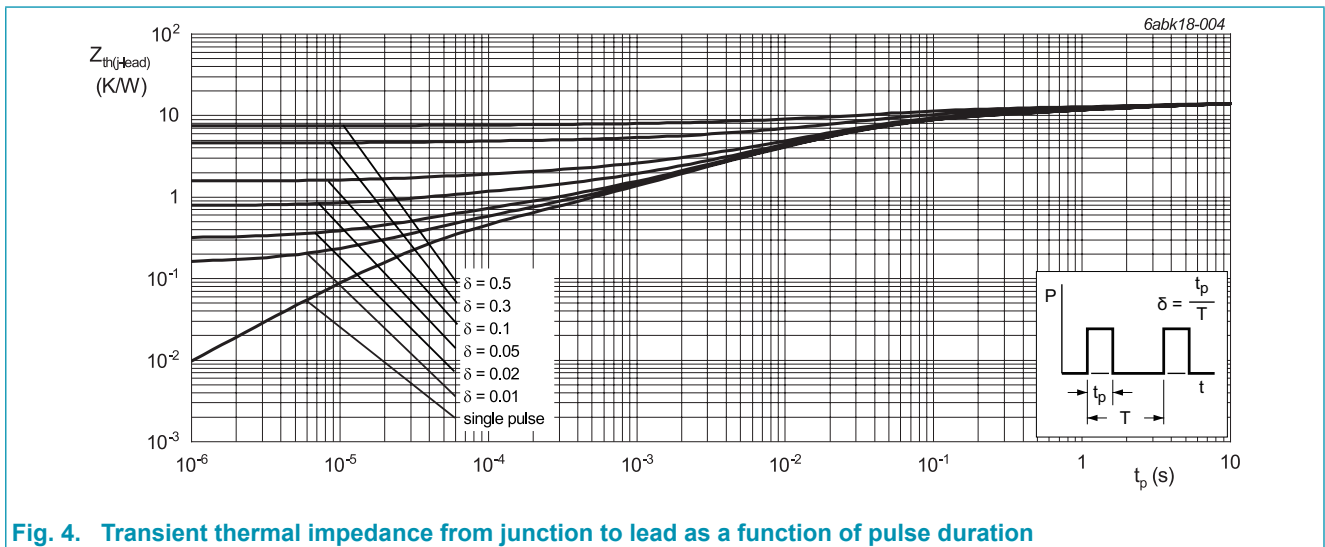
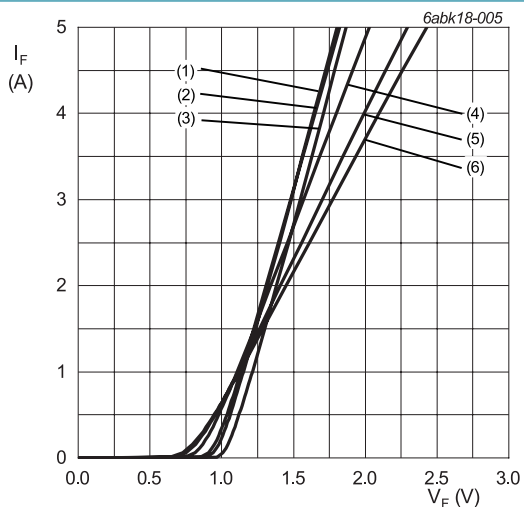


Fig. 4. Transient thermal impedance from junction to lead as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward current	$I_F = 1\text{ A}; T_j = 25\text{ °C}; \text{Fig. 5}$	-	1.15	1.4	V
		$I_F = 1\text{ A}; T_j = 150\text{ °C}; \text{Fig. 5}$	-	1.15	1.4	V
		$I_F = 1\text{ A}; T_j = 175\text{ °C}; \text{Fig. 5}$	-	1.15	1.4	V
I_R	reverse current	$V_R = 650\text{ V}; T_j = 25\text{ °C}; \text{Fig. 6}$	-	0.2	20	μA
		$V_R = 650\text{ V}; T_j = 175\text{ °C}; \text{Fig. 6}$	-	10	200	μA
Dynamic characteristics						
Q_r	recovered charge	$I_F = 1\text{ A}; V_R = 400\text{ V}; \text{d}I_F/\text{d}t = 500\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 7}$	-	10	-	nC
C_d	diode capacitance	$f = 1\text{ MHz}; V_R = 1\text{ V}; T_j = 25\text{ °C}$	-	130	-	pF
		$f = 1\text{ MHz}; V_R = 300\text{ V}; T_j = 25\text{ °C}$	-	17	-	pF
		$f = 1\text{ MHz}; V_R = 600\text{ V}; T_j = 25\text{ °C}$	-	15	-	pF
E_{as}	non-repetitive avalanche energy	$I_R = 2.7\text{ A}; L = 5\text{ mH}; T_{j(\text{init})} = 25\text{ °C}$	18	-	-	mJ



$V_o = 0.734\text{ V}; R_s = 0.5233\ \Omega$
 (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

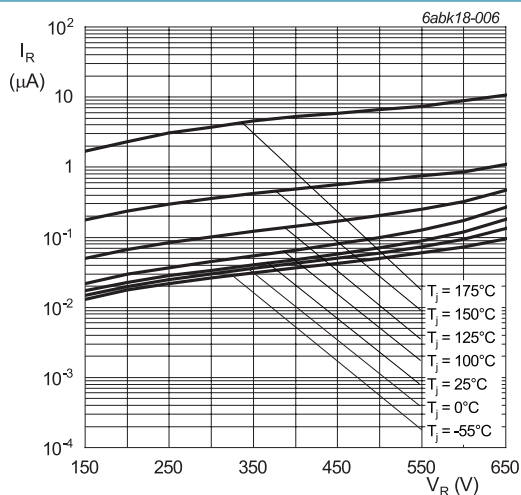


Fig. 6. Reverse leakage current as a function of reverse voltage; typical value

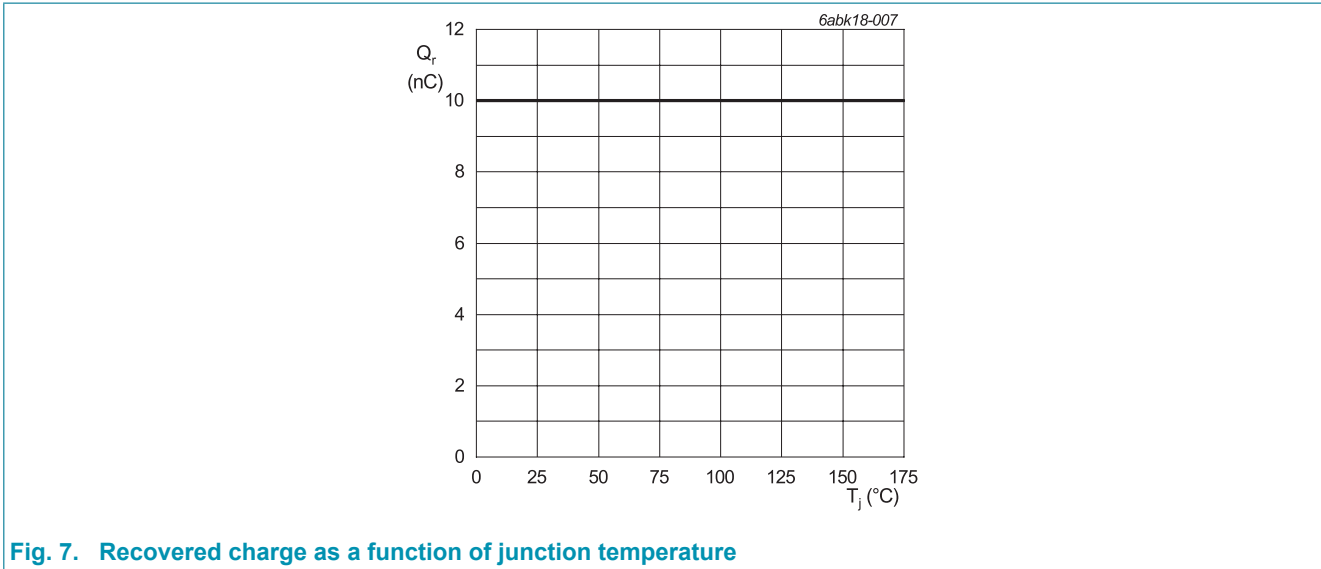
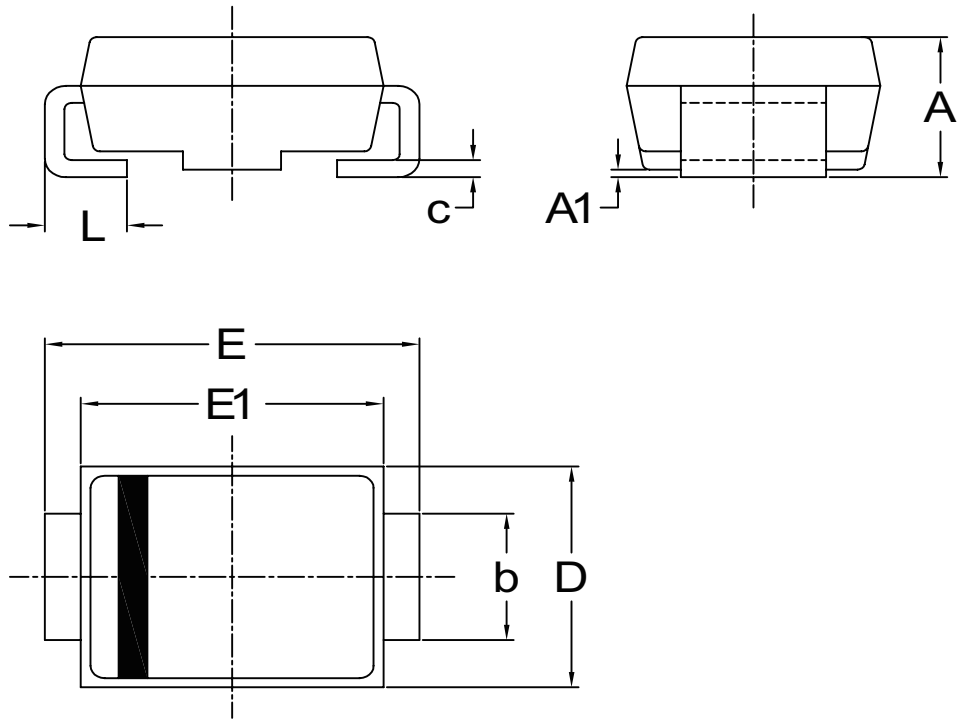


Fig. 7. Recovered charge as a function of junction temperature

11. Package outline



UNIT	A	A1	b	c	D	E	E1	L	
mm	Max	2.50	0.20	2.21	0.31	3.95	5.60	4.60	1.60
	Min	2.00	0.05	1.96	0.15	3.30	5.20	4.05	0.75

Remark: Dimensions D and E1 do not include mold flash.

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