

## 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

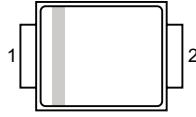
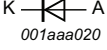
## 4. Quick reference data

Table 1. Quick reference data

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

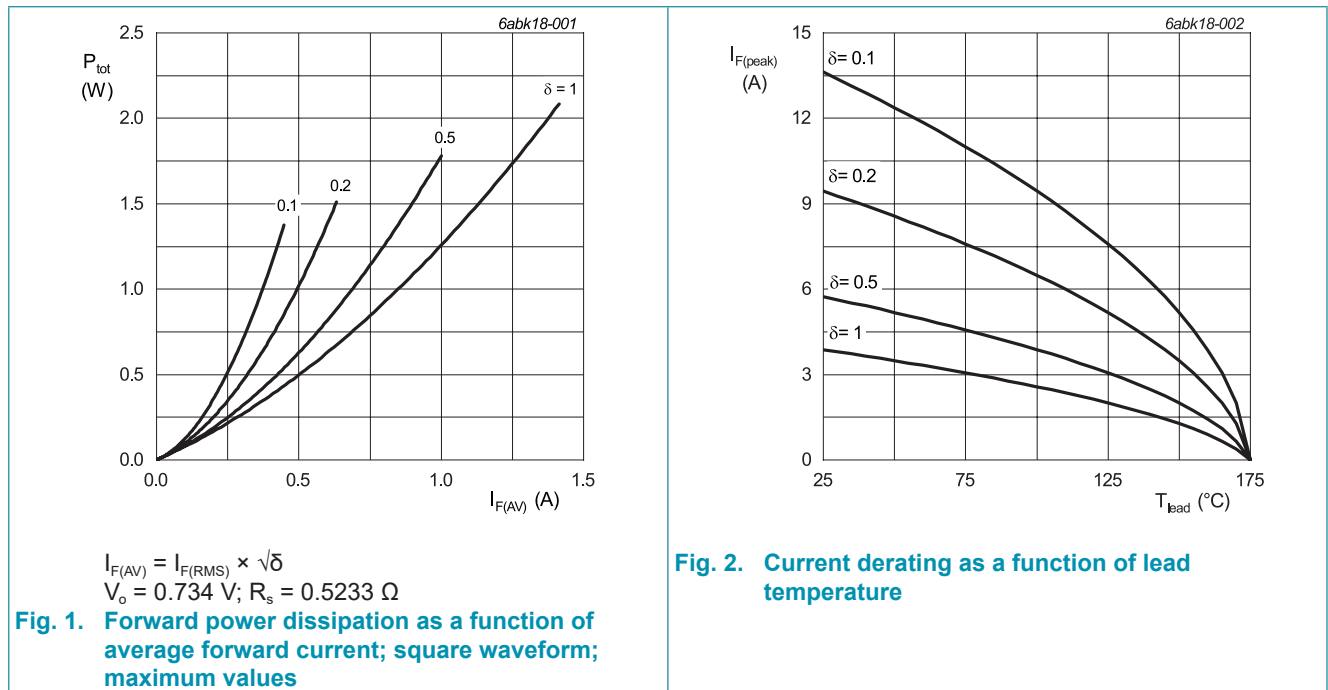
Type number	Marking codes
WNSC6D01650MB	6165ES

### 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; $T_{lead} \leq 150\text{ }^\circ\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	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	$t_p = 10\text{ ms}$ ; $T_{j(init)} = 25\text{ }^\circ\text{C}$ ; sine-wave pulse	18	A
		$t_p = 10\text{ }\mu\text{s}$ ; $T_{j(init)} = 25\text{ }^\circ\text{C}$ ; square-wave pulse	235	A
$I^2t$	$I^2t$ for fusing	sine-wave pulse; $T_{j(init)} = 25\text{ }^\circ\text{C}$ ; $t_p = 10\text{ ms}$	1.62	$\text{A}^2\text{s}$
$T_{stg}$	storage temperature		-55 to 175	$^\circ\text{C}$
$T_j$	junction temperature		175	$^\circ\text{C}$



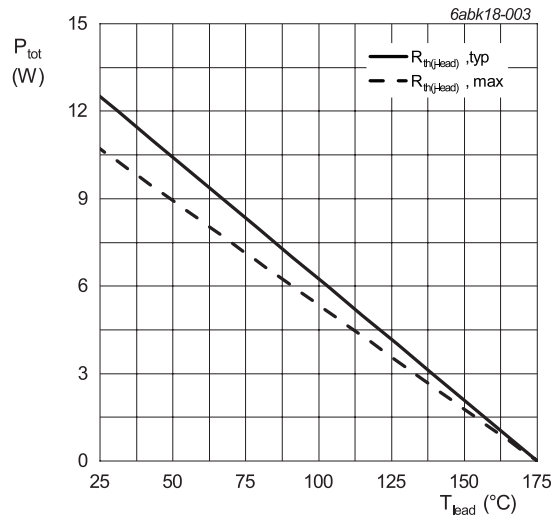


Fig. 3. Total power dissipation as a function of lead temperature

### 9. Thermal characteristics

Table 6. Thermal characteristics

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

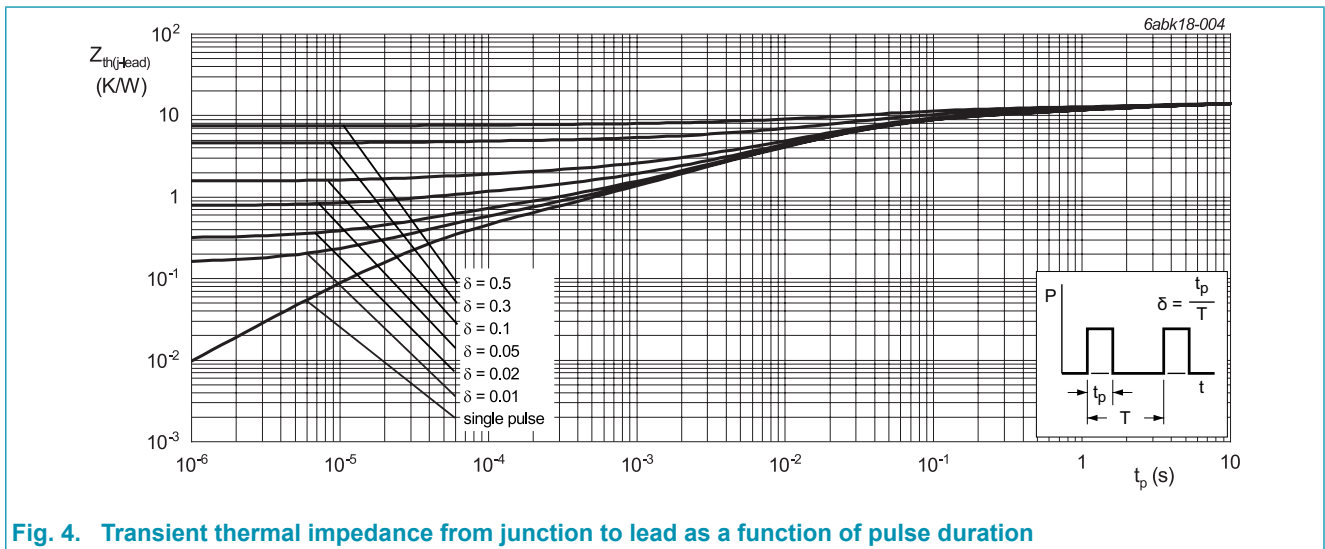
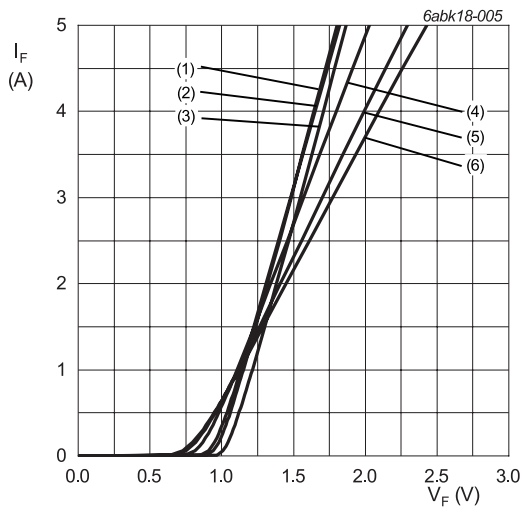


Fig. 4. Transient thermal impedance from junction to lead as a function of pulse duration

### 10. Characteristics

Table 7. Characteristics

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



$V_o = 0.734 \text{ V}; R_s = 0.5233 \text{ } \Omega$   
 (1)  $T_j = -55 \text{ }^\circ\text{C};$  typical values  
 (2)  $T_j = 0 \text{ }^\circ\text{C};$  typical values  
 (3)  $T_j = 25 \text{ }^\circ\text{C};$  typical values  
 (4)  $T_j = 100 \text{ }^\circ\text{C};$  typical values  
 (5)  $T_j = 150 \text{ }^\circ\text{C};$  typical values  
 (6)  $T_j = 175 \text{ }^\circ\text{C};$  typical values

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

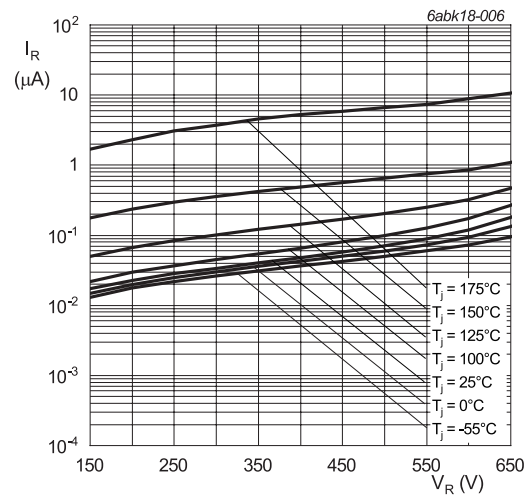


Fig. 6. Reverse leakage current as a function of reverse voltage; typical value

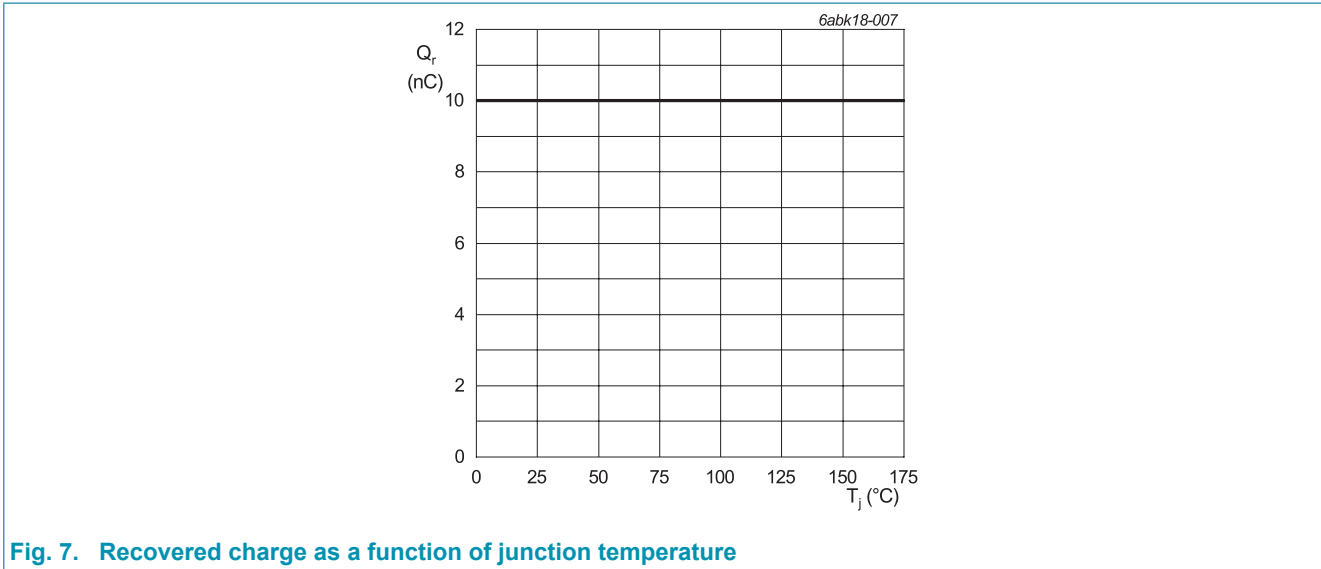
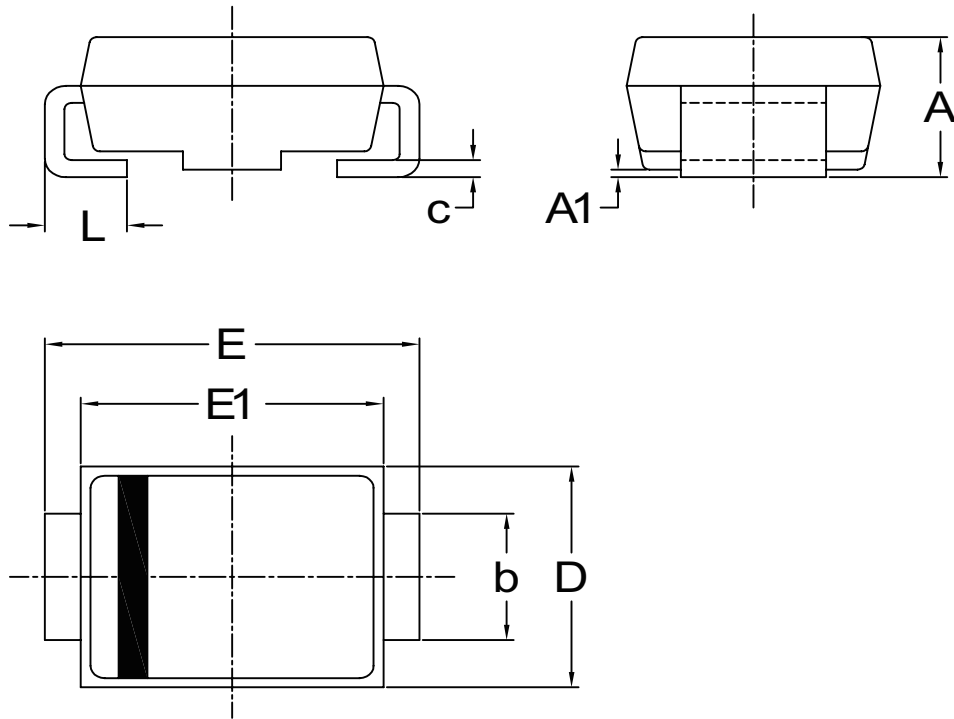


Fig. 7. Recovered charge as a function of junction temperature

### 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.



## 12. Legal information

### Data sheet status

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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