

## 1. General description

Silicon Carbide Schottky diode in a TO263 (D2PAK) plastic package, designed for high frequency switched-mode power supplies.



## 2. Features and benefits

- New 6th Generation Technology
- Low Forward Voltage Drop
- Low Reverse Leakage Current
- High Forward Surge Capability  $I_{FSM}$
- 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

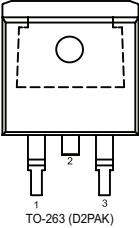
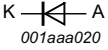
## 4. Quick reference data

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; $T_{mb} \leq 133$ °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	20			A
$T_j$	junction temperature		175			°C
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 20$ A; $T_j = 25$ °C; <a href="#">Fig. 5</a>	-	1.38	1.55	V
		$I_F = 20$ A; $T_j = 150$ °C; <a href="#">Fig. 5</a>	-	1.60	1.80	V
<b>Dynamic characteristics</b>						
$Q_r$	recovered charge	$I_F = 20$ A; $di_F/dt = 500$ A/ $\mu$ s; $V_R = 400$ V; $T_j = 25$ °C; <a href="#">Fig. 7</a>	-	36	-	nC

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	n.c.	not connected	 <p>TO-263 (D2PAK)</p>	 <p>K — &lt;— A 001aaa020</p>
2	K	cathode [1]		
3	A	anode		
mb	K	mounting base; connected to cathode		

[1] It is not possible to connect to pin 2 of the TO263 package.

## 6. Ordering information

Table 3. Ordering information

Type number	Package name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
WNSC6D20650B	TO263	WNSC6D20650B6J	Reel	800	TO263N	26-Sep-2016

## 7. Marking

Table 4. Marking codes

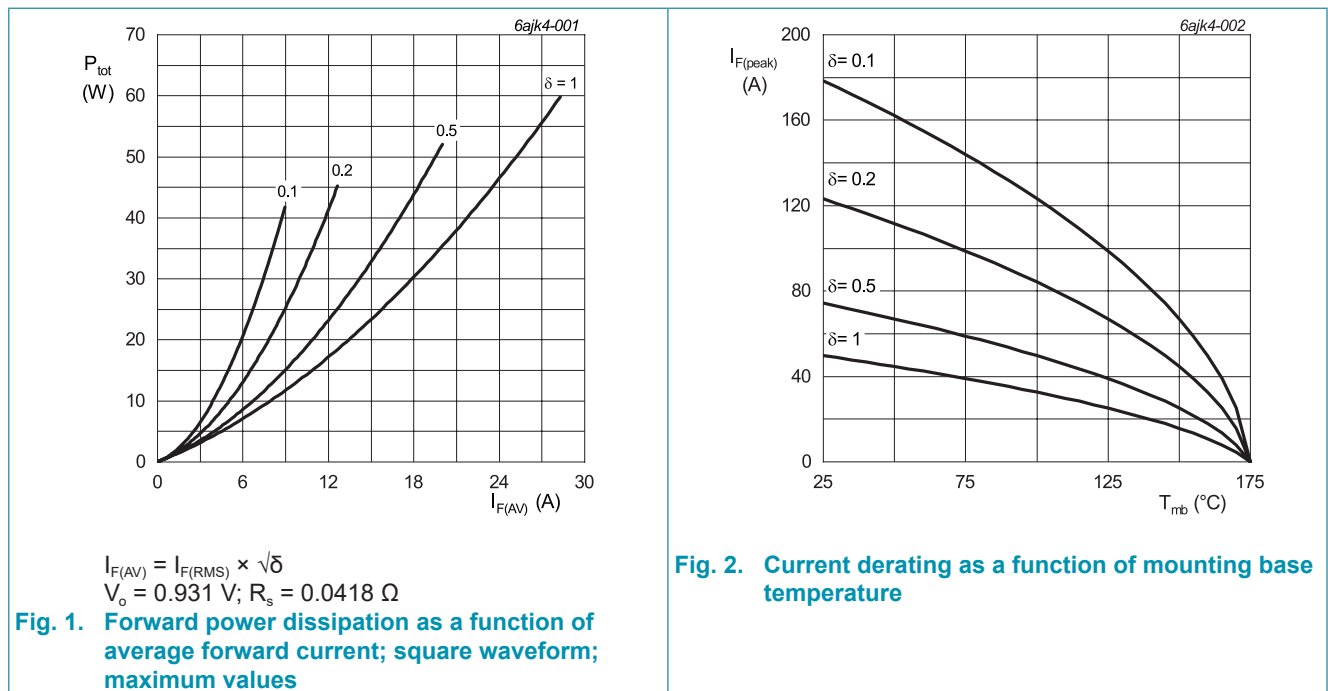
Type number	Marking codes
WNSC6D20650B	WNSC6D 20650B

## 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; $T_{mb} \leq 133\text{ }^\circ\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	20	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_{mb} \leq 133\text{ }^\circ\text{C}$ ; square-wave pulse	40	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	120	A
		$t_p = 10\text{ }\mu\text{s}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; square-wave pulse	900	A
$I^2t$	$I^2t$ for fusing	sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; $t_p = 10\text{ ms}$	72	$\text{A}^2\text{s}$
$T_{stg}$	storage temperature		-55 to 175	$^\circ\text{C}$
$T_j$	junction temperature		175	$^\circ\text{C}$



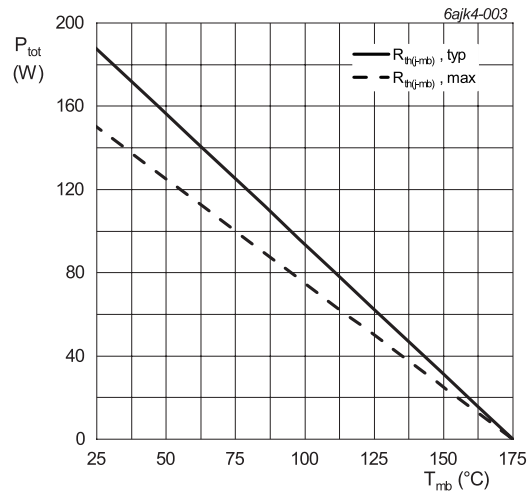


Fig. 3. Total power dissipation as a function of mounting base temperature

## 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	<a href="#">Fig. 4</a>	-	0.8	1	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	50	-	K/W

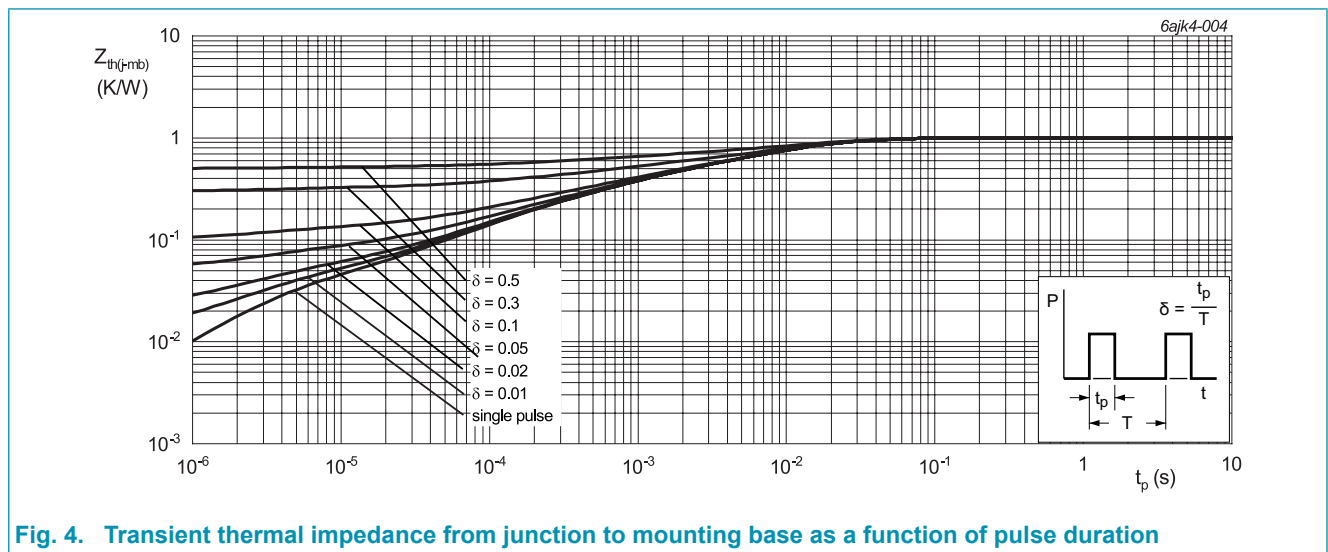
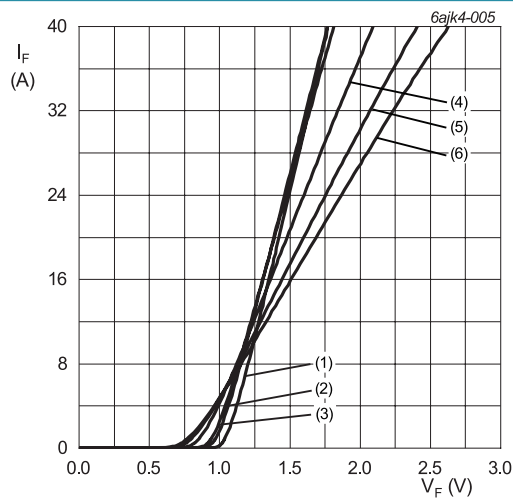


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

### 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward current	$I_F = 20 \text{ A}; T_J = 25 \text{ }^\circ\text{C}; \text{ Fig. 5}$	-	1.38	1.55	V
		$I_F = 20 \text{ A}; T_J = 150 \text{ }^\circ\text{C}; \text{ Fig. 5}$	-	1.60	1.80	V
		$I_F = 20 \text{ A}; T_J = 175 \text{ }^\circ\text{C}; \text{ Fig. 5}$	-	1.70	1.90	V
$I_R$	reverse current	$V_R = 650 \text{ V}; T_J = 25 \text{ }^\circ\text{C}; \text{ Fig. 6}$	-	1	80	$\mu\text{A}$
		$V_R = 650 \text{ V}; T_J = 175 \text{ }^\circ\text{C}; \text{ Fig. 6}$	-	25	320	$\mu\text{A}$
<b>Dynamic characteristics</b>						
$Q_r$	recovered charge	$I_F = 20 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 500 \text{ A}/\mu\text{s}; T_J = 25 \text{ }^\circ\text{C}; \text{ Fig. 7}$	-	36	-	nC
$C_d$	diode capacitance	$f = 1 \text{ MHz}; V_R = 1 \text{ V}; T_J = 25 \text{ }^\circ\text{C}$	-	780	-	pF
		$f = 1 \text{ MHz}; V_R = 300 \text{ V}; T_J = 25 \text{ }^\circ\text{C}$	-	86	-	pF
		$f = 1 \text{ MHz}; V_R = 600 \text{ V}; T_J = 25 \text{ }^\circ\text{C}$	-	79	-	pF
$E_{as}$	non-repetitive avalanche energy	$I_R = 7 \text{ A}; L = 5 \text{ mH}; T_{J(\text{init})} = 25 \text{ }^\circ\text{C}$	120	-	-	mJ



$V_o = 0.931 \text{ V}; R_s = 0.0418 \text{ } \Omega$   
 (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

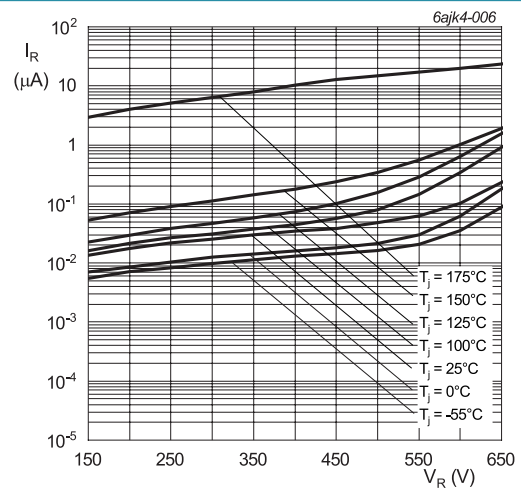


Fig. 6. Reverse leakage current as a function of reverse voltage; typical value

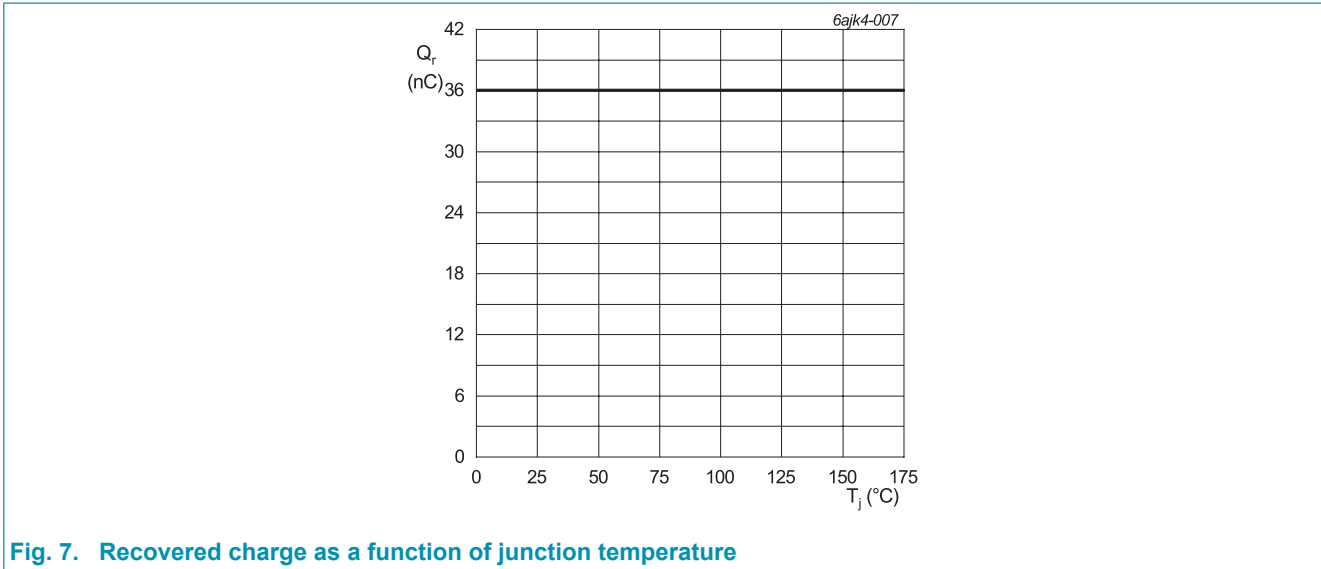
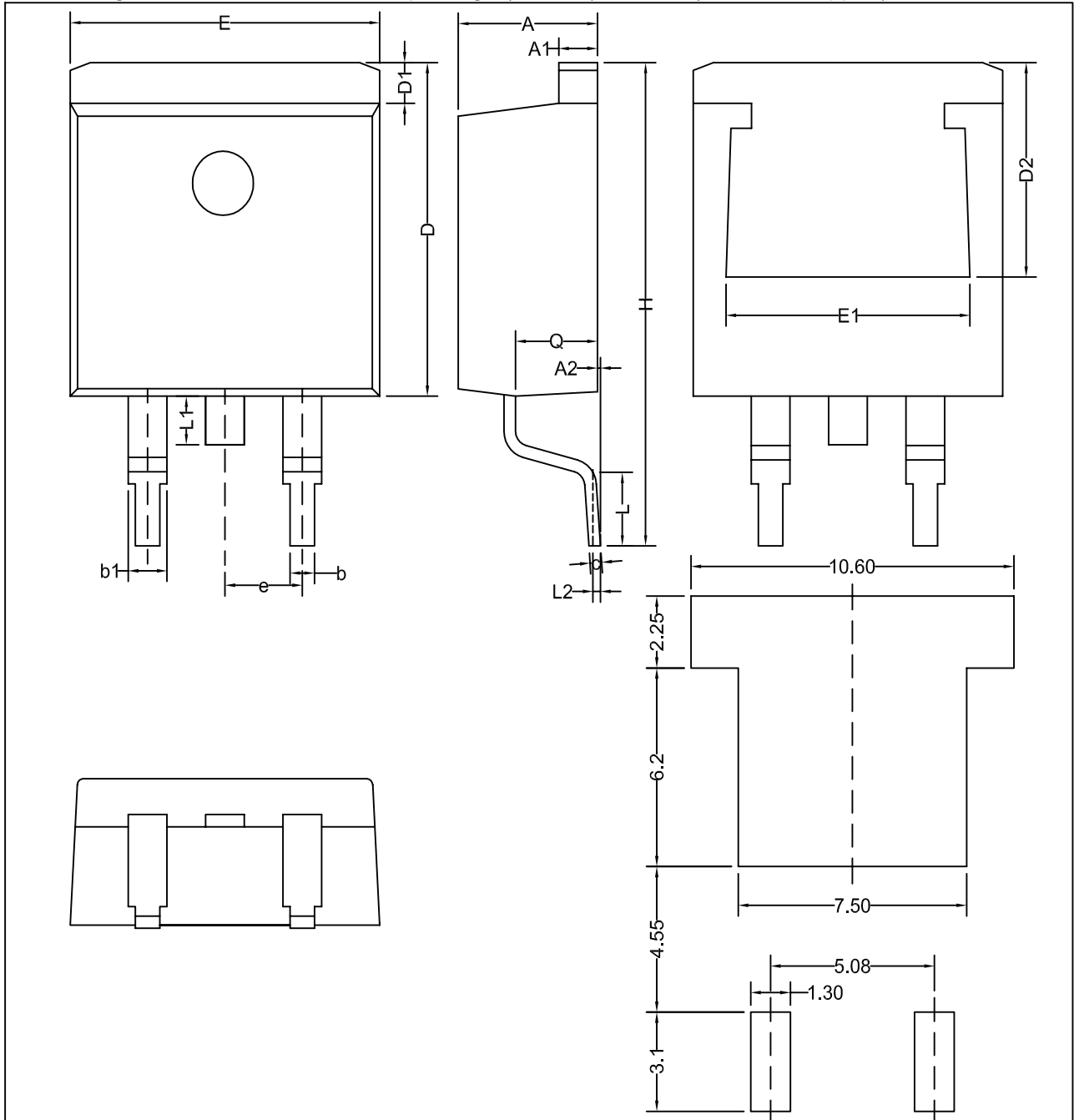


Fig. 7. Recovered charge as a function of junction temperature

### 11. Package outline

Plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped) TO263



Recommended Footprint

Unit	A	A1	A2	b	b1	c	D	D1	D2	e	E	E1	H	L	L1	L2	Q
min	4.10	1.22	0.00	0.60	1.05	0.34	---	1.20	6.60	2.54 (BSC)	9.70	7.80	14.80	2.10	---	0.25 (BSC)	2.20
max	4.70	1.40	0.25	0.90	1.45	0.64	11.00	1.60	---	---	10.30	---	15.80	2.90	1.75	---	2.79



## 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.
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### 13. Contents

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1. General description.....	1
2. Features and benefits .....	1
3. Applications .....	1
4. Quick reference data.....	1
5. Pinning information.....	2
6. Ordering information.....	2
7. Marking.....	2
8. Limiting values .....	3
9. Thermal characteristics .....	5
10. Characteristics.....	6
11. Package outline .....	8
12. Legal information .....	9
13. Contents .....	11

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