

## 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

- 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

## 3. Applications

- Power factor correction
- Telecom/Server SMPS
- UPS
- PV inverter
- PC Silverbox
- LED/OLED TV
- Motor Drives

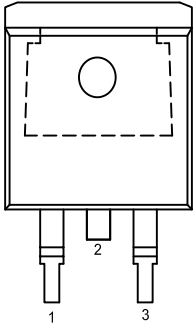
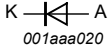
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	-	650	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $T_{mb} \leq 113$ °C; square-wave pulse; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a> ; <a href="#">Fig. 4</a>	-	-	10	A
$T_j$	junction temperature		-	-	175	°C
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 10$ A; $T_j = 25$ °C; <a href="#">Fig. 6</a>	-	1.5	1.7	V
		$I_F = 10$ A; $T_j = 150$ °C; <a href="#">Fig. 6</a>	-	1.8	2.1	V
<b>Dynamic characteristics</b>						
$Q_r$	recovered charge	$I_F = 10$ A; $di_F/dt = 500$ A/ $\mu$ s; $V_R = 400$ V; $T_j = 25$ °C; <a href="#">Fig. 8</a> ; <a href="#">Fig. 9</a>	-	15	22	nC

## 5. Pinning information

**Table 2. Pinning information**

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	n.c.	not connected	 <p><b>D2PAK (TO263N)</b></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**

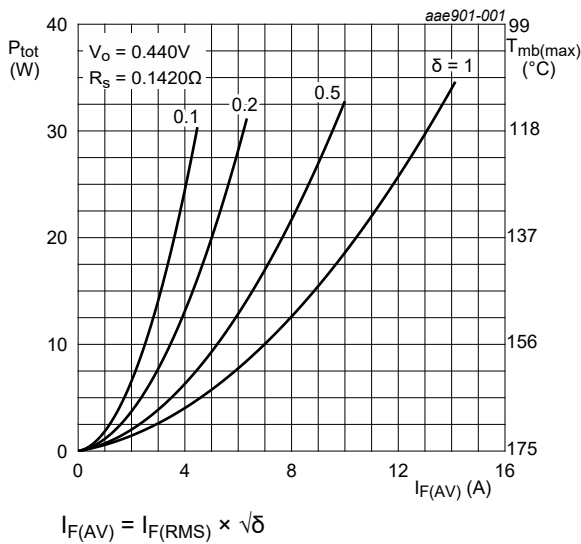
Type number	Package		
	Name	Description	Version
NXPSC10650B	D2PAK	plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)	TO263N

## 7. Limiting values

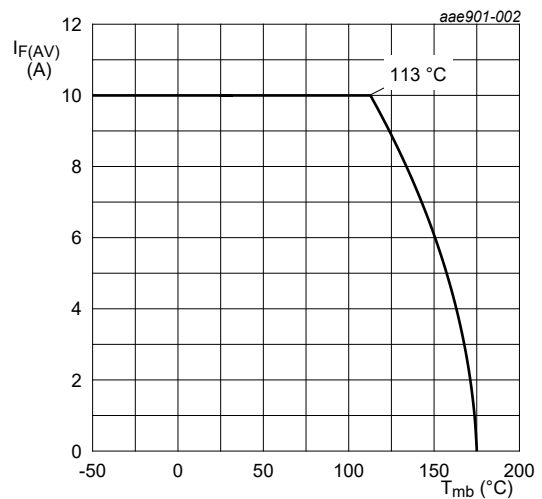
**Table 4. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	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	$\delta = 0.5$ ; $T_{mb} \leq 113\text{ }^\circ\text{C}$ ; square-wave pulse; Fig. 1; Fig. 2; Fig. 3; Fig. 4	-	10	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; square-wave pulse	-	20	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	-	50	A
		$t_p = 10\text{ }\mu\text{s}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; square-wave pulse	-	450	A
$I^2t$	$I^2t$ for fusing	sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; $t_p = 10\text{ ms}$	-	12.5	A <sup>2</sup> s
$T_{stg}$	storage temperature		-55	175	$^\circ\text{C}$
$T_j$	junction temperature		-	175	$^\circ\text{C}$



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



**Fig. 2. Forward current as a function of mounting base temperature; maximum values**

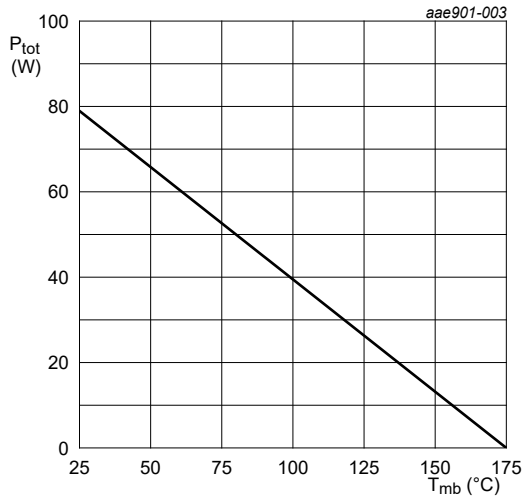


Fig. 3. Total power dissipation as a function of mounting base temperature

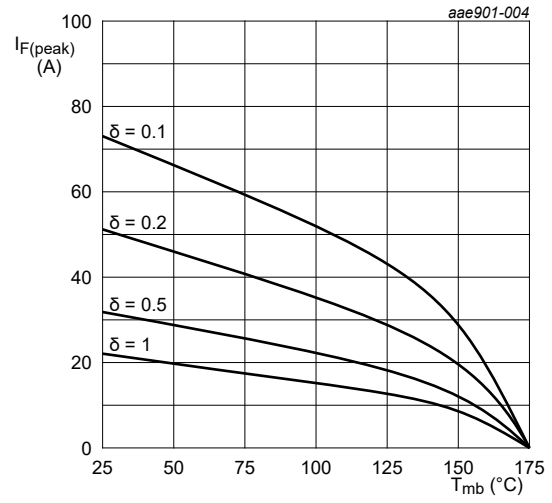


Fig. 4. Current derating as a function of mounting base temperature

### 8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	<a href="#">Fig. 5</a>	-	-	1.9	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	Device mounted on an FR4 Printed-Circuit Board (PCB)	-	50	-	K/W

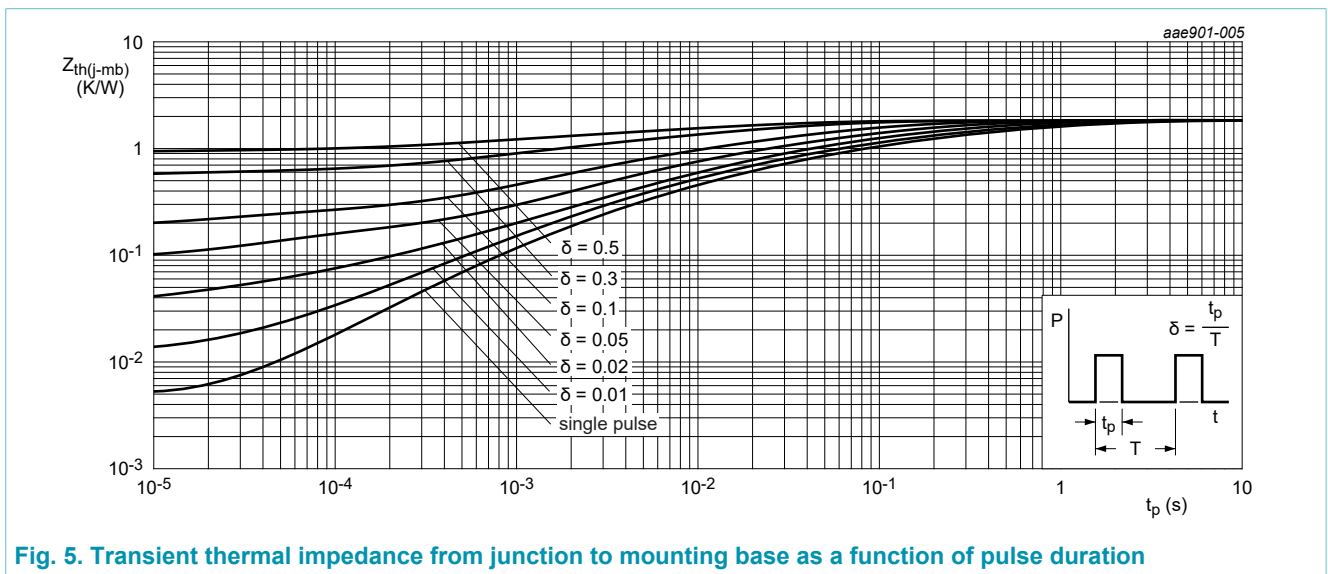
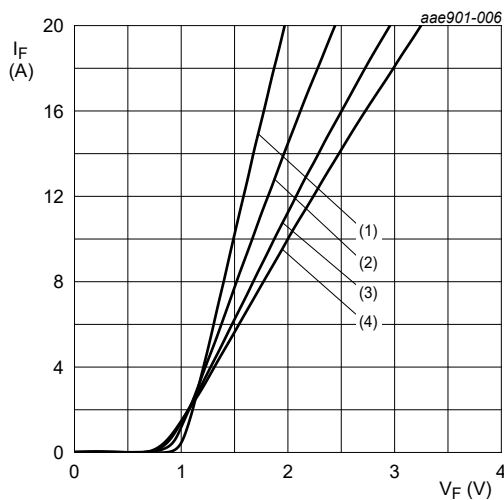


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

### 9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 10\text{ A}; T_j = 25\text{ °C}; \text{Fig. 6}$	-	1.5	1.7	V
		$I_F = 10\text{ A}; T_j = 150\text{ °C}; \text{Fig. 6}$	-	1.8	2.1	V
$I_R$	reverse current	$V_R = 650\text{ V}; T_j = 25\text{ °C}; \text{Fig. 7}$	-	12	250	$\mu\text{A}$
		$V_R = 650\text{ V}; T_j = 150\text{ °C}; \text{Fig. 7}$	-	-	800	$\mu\text{A}$
		$V_R = 600\text{ V}; T_j = 25\text{ °C}; \text{Fig. 7}$	-	6	100	$\mu\text{A}$
		$V_R = 600\text{ V}; T_j = 150\text{ °C}; \text{Fig. 7}$	-	-	450	$\mu\text{A}$
<b>Dynamic characteristics</b>						
$Q_r$	recovered charge	$I_F = 10\text{ A}; di_F/dt = 500\text{ A}/\mu\text{s}; V_R = 400\text{ V}; T_j = 25\text{ °C}; \text{Fig. 8}; \text{Fig. 9}$	-	15	22	nC
$C_d$	diode capacitance	$f = 1\text{ MHz}; V_R = 1\text{ V}; T_j = 25\text{ °C}$	-	300	-	pF
		$f = 1\text{ MHz}; V_R = 300\text{ V}; T_j = 25\text{ °C}$	-	34	-	pF
		$f = 1\text{ MHz}; V_R = 600\text{ V}; T_j = 25\text{ °C}$	-	28	40	pF



- (1)  $T_j = 25\text{ °C}$ ; typical values
- (2)  $T_j = 100\text{ °C}$ ; typical values
- (3)  $T_j = 150\text{ °C}$ ; typical values
- (4)  $T_j = 175\text{ °C}$ ; typical values

Fig. 6. Forward current as a function of forward voltage; typical values

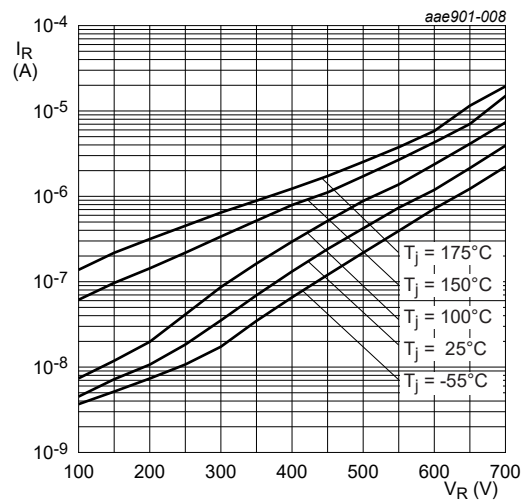


Fig. 7. Reverse current as a function of reverse voltage; typical values

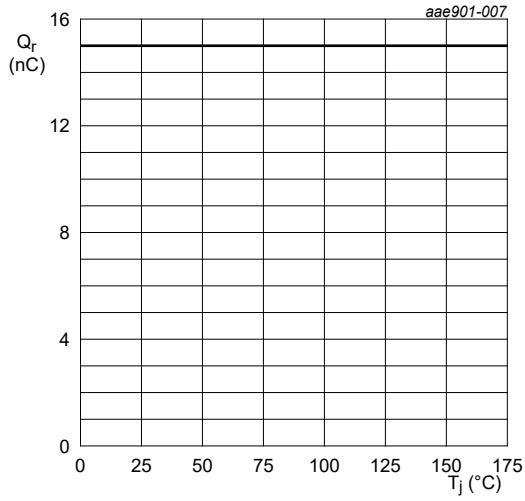


Fig. 8. Recovered charge as a function of junction temperature

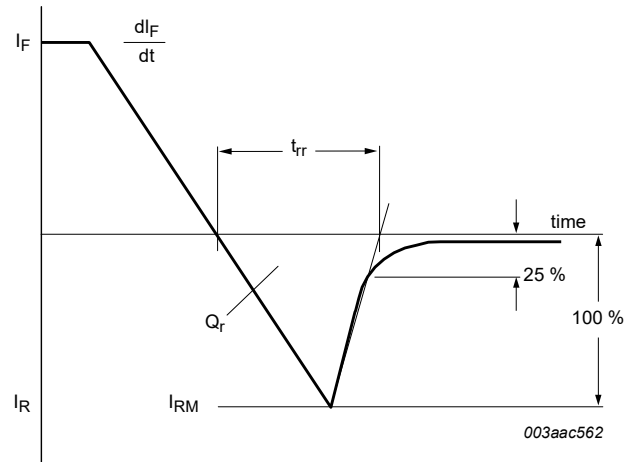


Fig. 9. Reverse recovery definitions; ramp recovery

10. Package outline

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

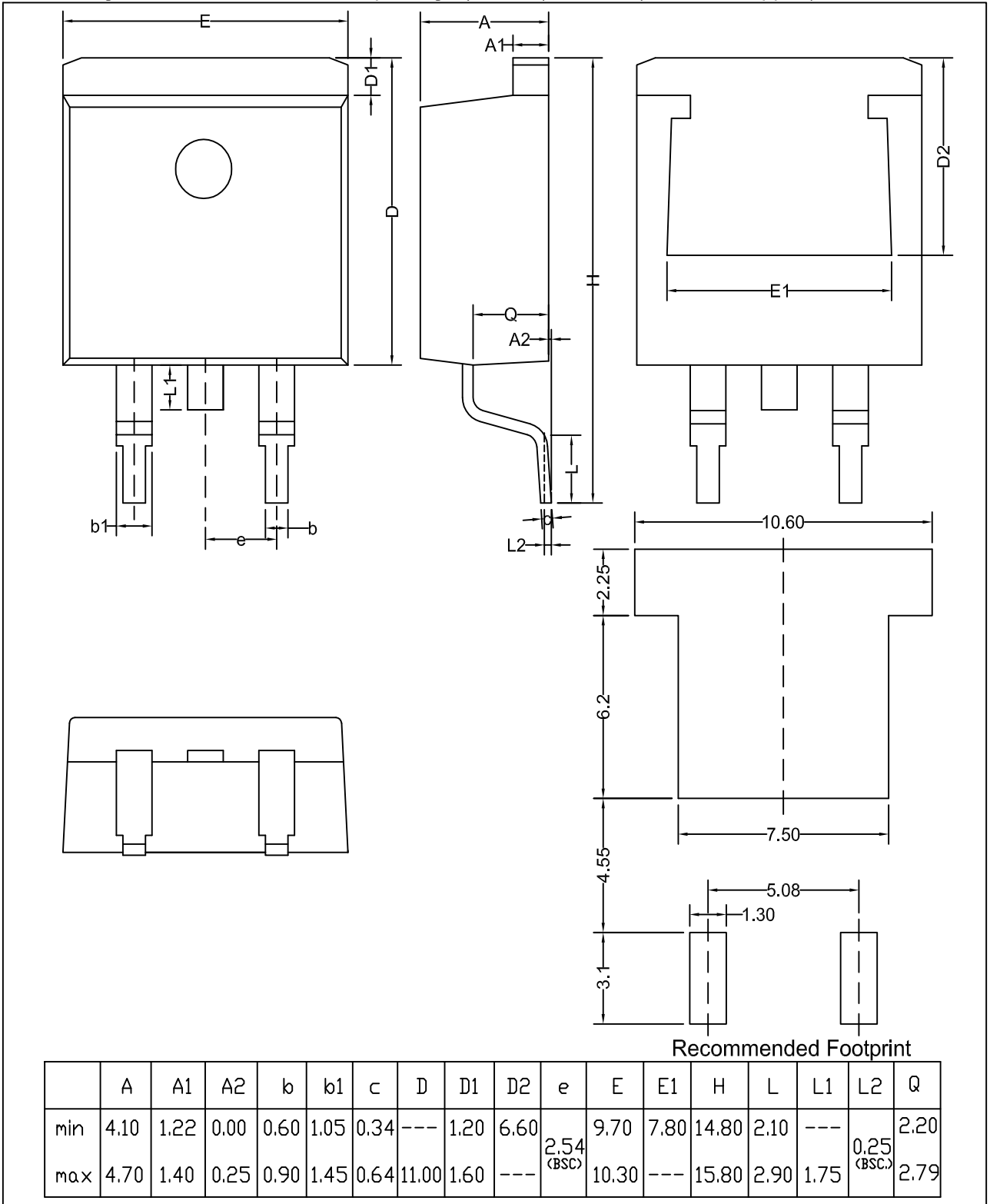


Fig. 10. Package outline D2PAK (TO263N)



# 11. 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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