

1. General description

Silicon Carbide Schottky diode designed for high frequency switched mode power supplies in a TO252 (DPAK) plastic package.

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

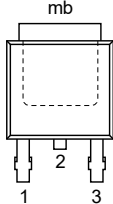
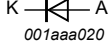
4. Quick reference data

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	$\delta = 0.5$; $T_{mb} \leq 136$ °C; square-wave pulse; Fig. 1 ; Fig. 2 ; Fig. 3 ; Fig. 4	-	-	4	A
T_j	junction temperature		-	-	175	°C
Static characteristics						
V_F	forward voltage	$I_F = 4$ A; $T_j = 25$ °C; Fig. 6	-	1.5	1.7	V
		$I_F = 4$ A; $T_j = 150$ °C	-	1.8	2.1	V
Dynamic characteristics						
Q_r	recovered charge	$I_F = 4$ A; $di_F/dt = 500$ A/ μ s; $V_R = 400$ V; $T_j = 25$ °C; Fig. 7	-	7	-	nC

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	n.c.	not connected	 <p style="text-align: center;">DPAK (TO252NS)</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 TO252 package.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
NXPSC04650D	DPAK	plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped)	TO252NS

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	$\delta = 0.5$; $T_{mb} \leq 136\text{ }^\circ\text{C}$; square-wave pulse; Fig. 1; Fig. 2; Fig. 3; Fig. 4	-	4	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; square-wave pulse	-	8	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	-	24	A
		$t_p = 10\text{ }\mu\text{s}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; square-wave pulse	-	235	A
T_{stg}	storage temperature		-55	175	$^\circ\text{C}$
T_j	junction temperature		-	175	$^\circ\text{C}$

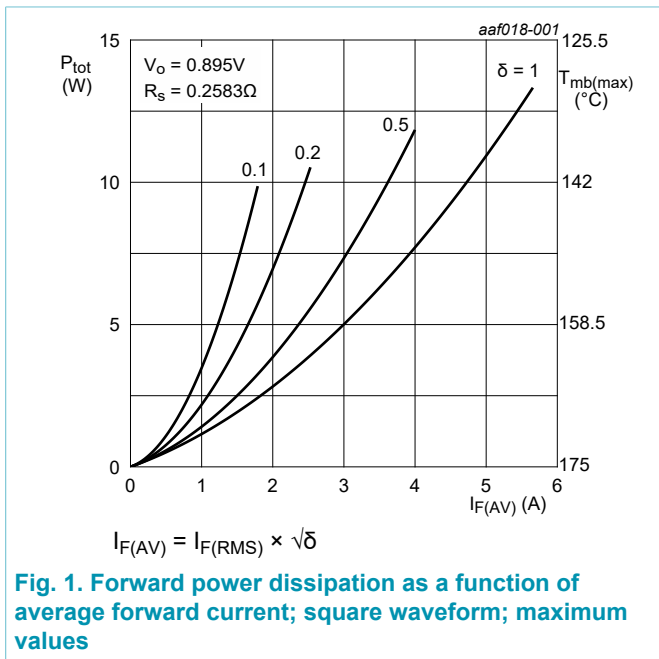


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

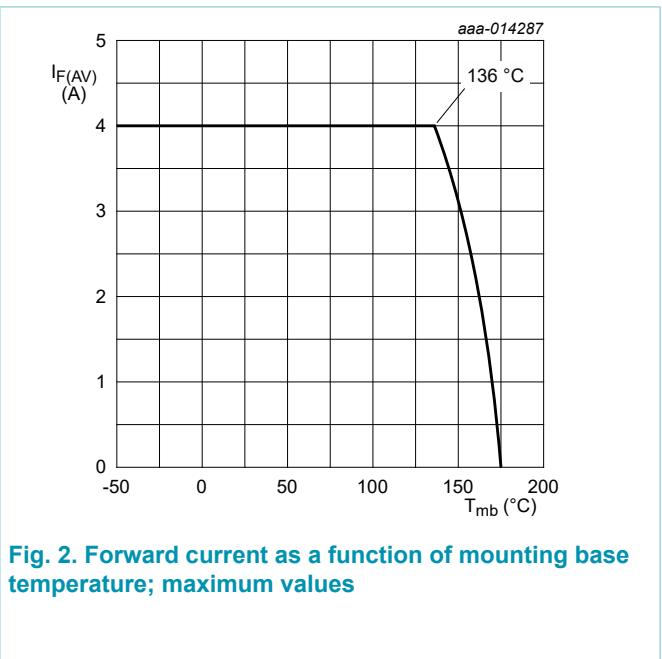


Fig. 2. Forward current as a function of mounting base temperature; maximum values

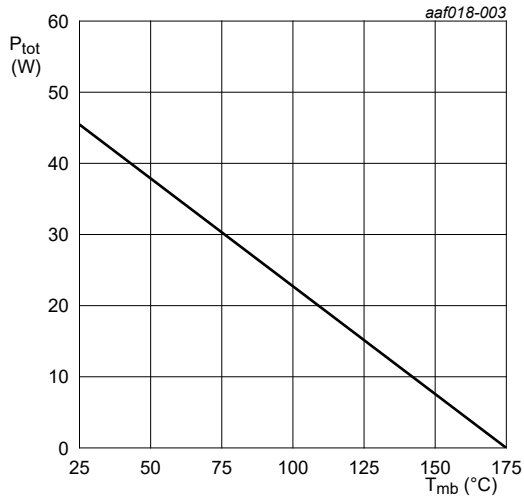


Fig. 3. Total power dissipation as a function of mounting base temperature

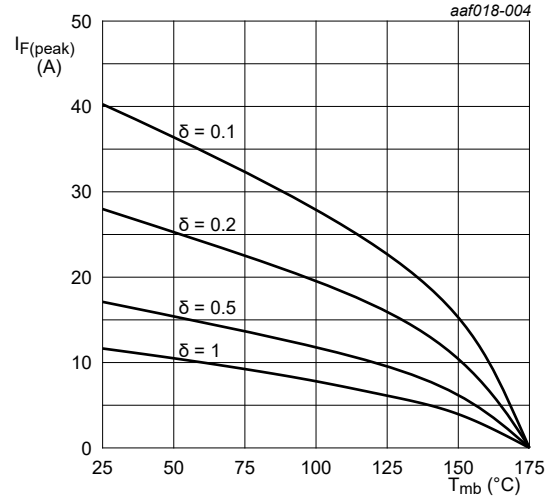


Fig. 4. Current derating as a function of mounting base temperature

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	Fig. 5	-	-	3.3	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	Device mounted on an FR4 Printed-Circuit Board	-	50	-	K/W

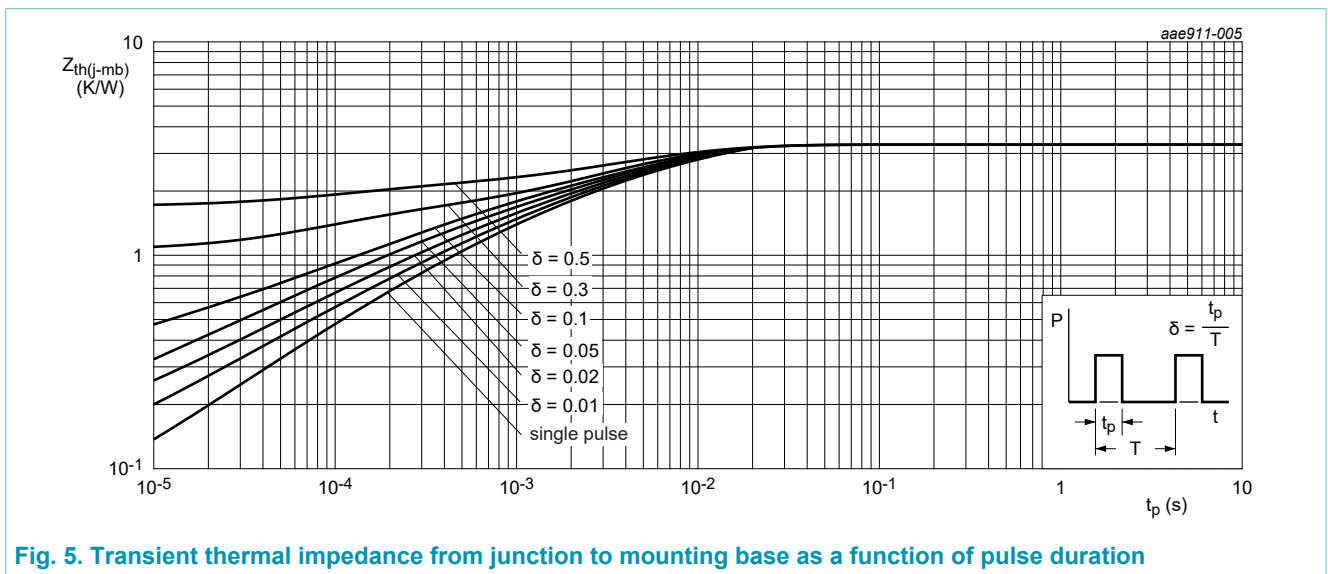
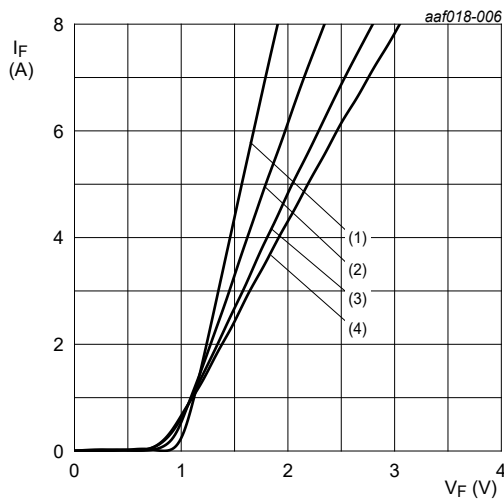


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 4\text{ A}; T_j = 25\text{ °C}; \text{Fig. 6}$	-	1.5	1.7	V
		$I_F = 4\text{ A}; T_j = 150\text{ °C}$	-	1.8	2.1	V
I_R	reverse current	$V_R = 650\text{ V}; T_j = 25\text{ °C}$	-	-	170	μA
		$V_R = 650\text{ V}; T_j = 150\text{ °C}$	-	-	550	μA
Dynamic characteristics						
Q_r	recovered charge	$I_F = 4\text{ A}; dI_F/dt = 500\text{ A}/\mu\text{s}; V_R = 400\text{ V}; T_j = 25\text{ °C}; \text{Fig. 7}$	-	7	-	nC
C_d	diode capacitance	$f = 1\text{ MHz}; V_R = 1\text{ V}; T_j = 25\text{ °C}$	-	130	-	pF
		$f = 1\text{ MHz}; V_R = 300\text{ V}; T_j = 25\text{ °C}$	-	16	-	pF
		$f = 1\text{ MHz}; V_R = 600\text{ V}; T_j = 25\text{ °C}$	-	13	-	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

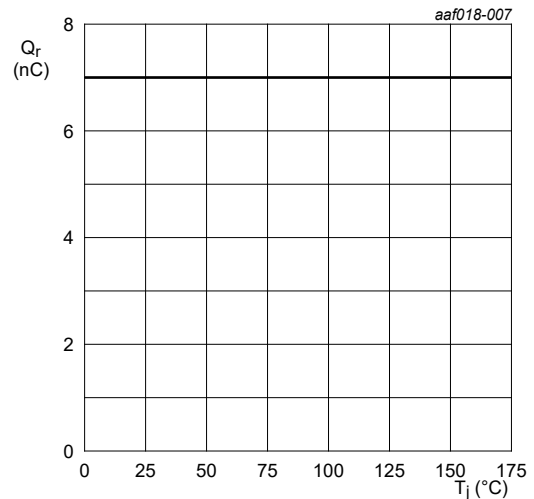


Fig. 7. Recovered charge as a function of junction temperature

10. Package outline

Plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped) TO252

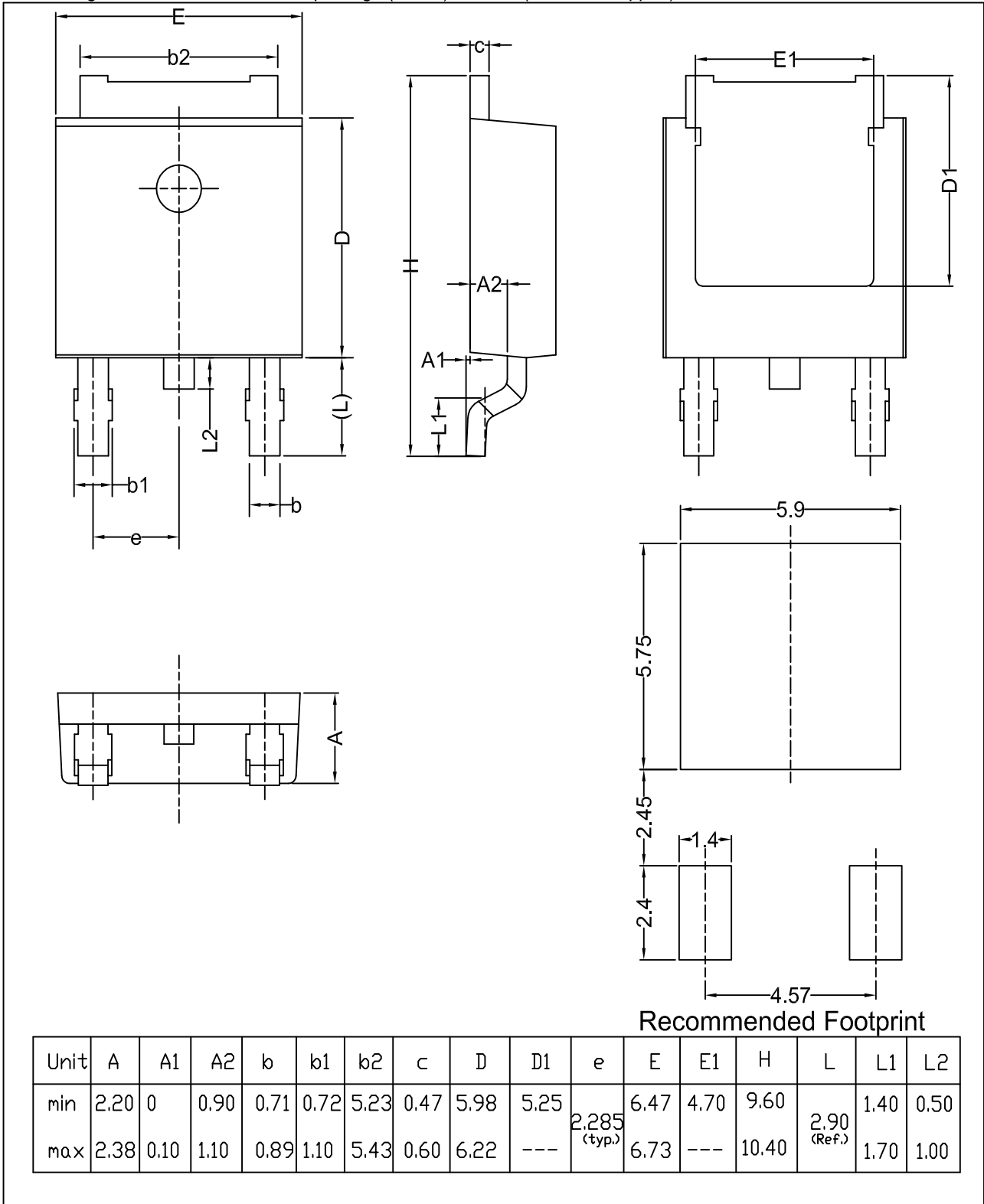


Fig. 8. Package outline DPAK (TO252NS)

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.
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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