

## 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

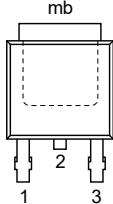
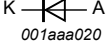
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V <sub>RRM</sub>	repetitive peak reverse voltage			-	-	650	V
I <sub>F(AV)</sub>	average forward current	δ = 0.5 ; T <sub>mb</sub> ≤ 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 <sub>j</sub>	junction temperature			-	-	175	°C
Static characteristics							
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 10 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 6</a>		-	1.5	1.7	V
		I <sub>F</sub> = 10 A; T <sub>j</sub> = 150 °C; <a href="#">Fig. 6</a>		-	1.8	2.1	V
Dynamic characteristics							
Q <sub>r</sub>	recovered charge	I <sub>F</sub> = 10 A; dI <sub>F</sub> /dt = 500 A/μs; V <sub>R</sub> = 400 V; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a>		-	15	-	nC

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	n.c.	not connected	 DPAK (TO252NS)	
2	K	cathode <sup>[1]</sup>		
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
NXPSC10650D	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 <sub>RRM</sub>	repetitive peak reverse voltage		-	650	V
V <sub>RWM</sub>	crest working reverse voltage		-	650	V
V <sub>R</sub>	reverse voltage	DC	-	650	V
I <sub>F(AV)</sub>	average forward current	δ = 0.5 ; T <sub>mb</sub> ≤ 113 °C; square-wave pulse; Fig. 1; Fig. 2; Fig. 3; Fig. 4	-	10	A
I <sub>FRM</sub>	repetitive peak forward current	δ = 0.5 ; t <sub>p</sub> = 25 μs; square-wave pulse	-	20	A
I <sub>FSM</sub>	non-repetitive peak forward current	t <sub>p</sub> = 10 ms; T <sub>j(init)</sub> = 25 °C; sine-wave pulse	-	50	A
		t <sub>p</sub> = 10 μs; T <sub>j(init)</sub> = 25 °C; square-wave pulse	-	450	A
T <sub>stg</sub>	storage temperature		-55	175	°C
T <sub>j</sub>	junction temperature		-	175	°C

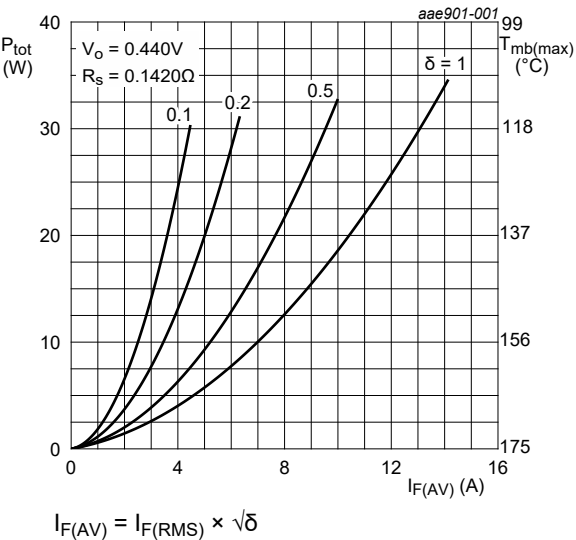


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

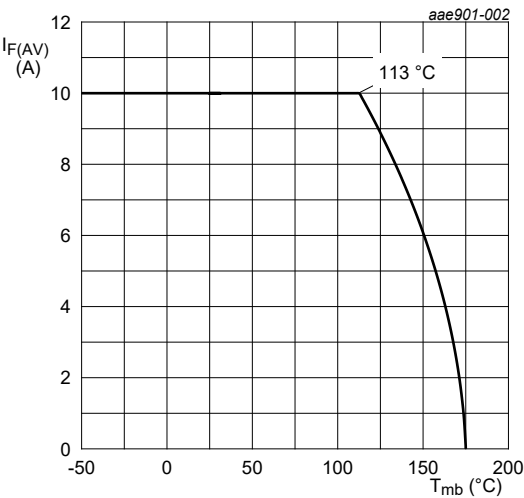


Fig. 2. Forward current as a function of mounting base temperature; maximum values

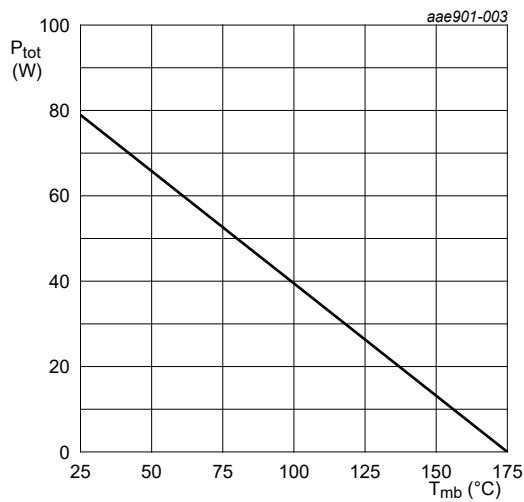


Fig. 3. Total power dissipation as a function of mounting base temperature

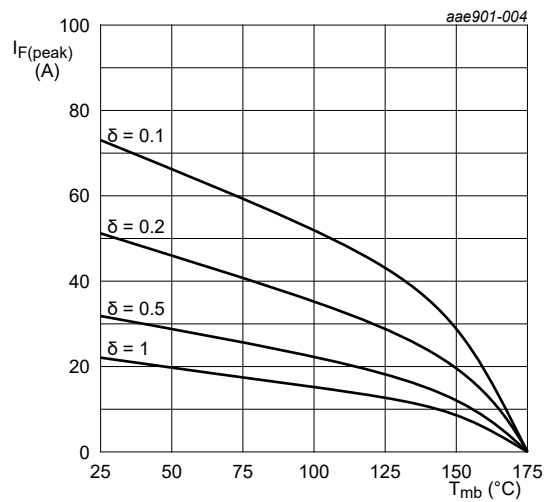


Fig. 4. Current derating as a function of mounting base temperature

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	-	50	-	K/W

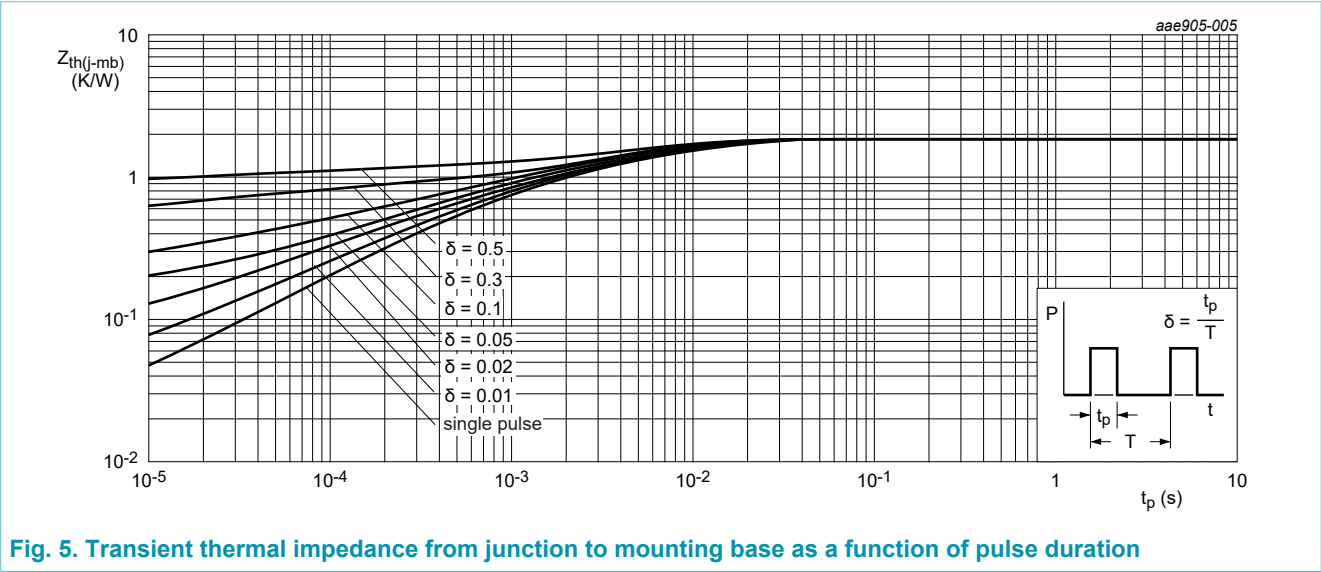
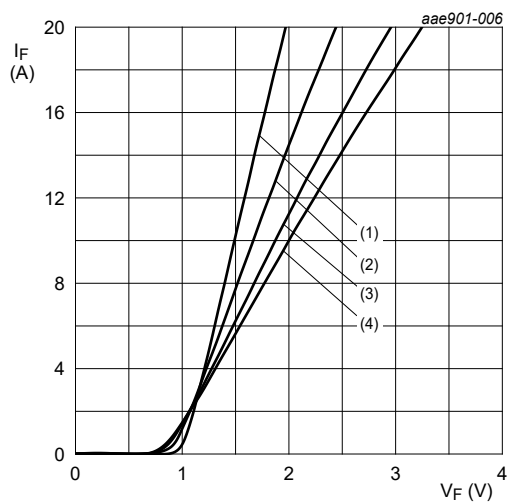


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 10 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 6</a>		-	1.5	1.7	V
		I <sub>F</sub> = 10 A; T <sub>j</sub> = 150 °C; <a href="#">Fig. 6</a>		-	1.8	2.1	V
I <sub>R</sub>	reverse current	V <sub>R</sub> = 650 V; T <sub>j</sub> = 25 °C		-	-	250	μA
		V <sub>R</sub> = 650 V; T <sub>j</sub> = 150 °C		-	-	800	μA
Dynamic characteristics							
Q <sub>r</sub>	recovered charge	I <sub>F</sub> = 10 A; dI <sub>F</sub> /dt = 500 A/μs; V <sub>R</sub> = 400 V; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a>		-	15	-	nC
C <sub>d</sub>	diode capacitance	f = 1 MHz; V <sub>R</sub> = 1 V; T <sub>j</sub> = 25 °C		-	300	-	pF
		f = 1 MHz; V <sub>R</sub> = 300 V; T <sub>j</sub> = 25 °C		-	34	-	pF
		f = 1 MHz; V <sub>R</sub> = 600 V; T <sub>j</sub> = 25 °C		-	28	-	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

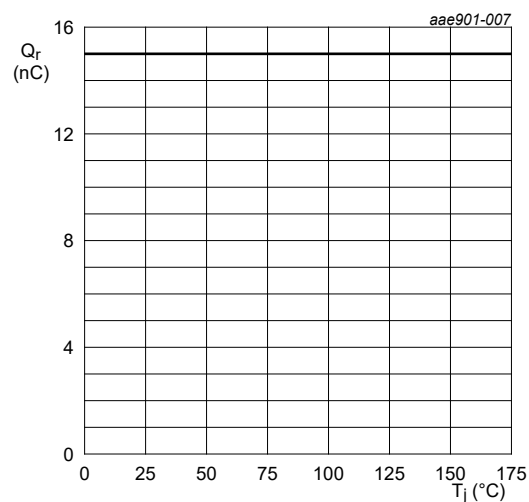
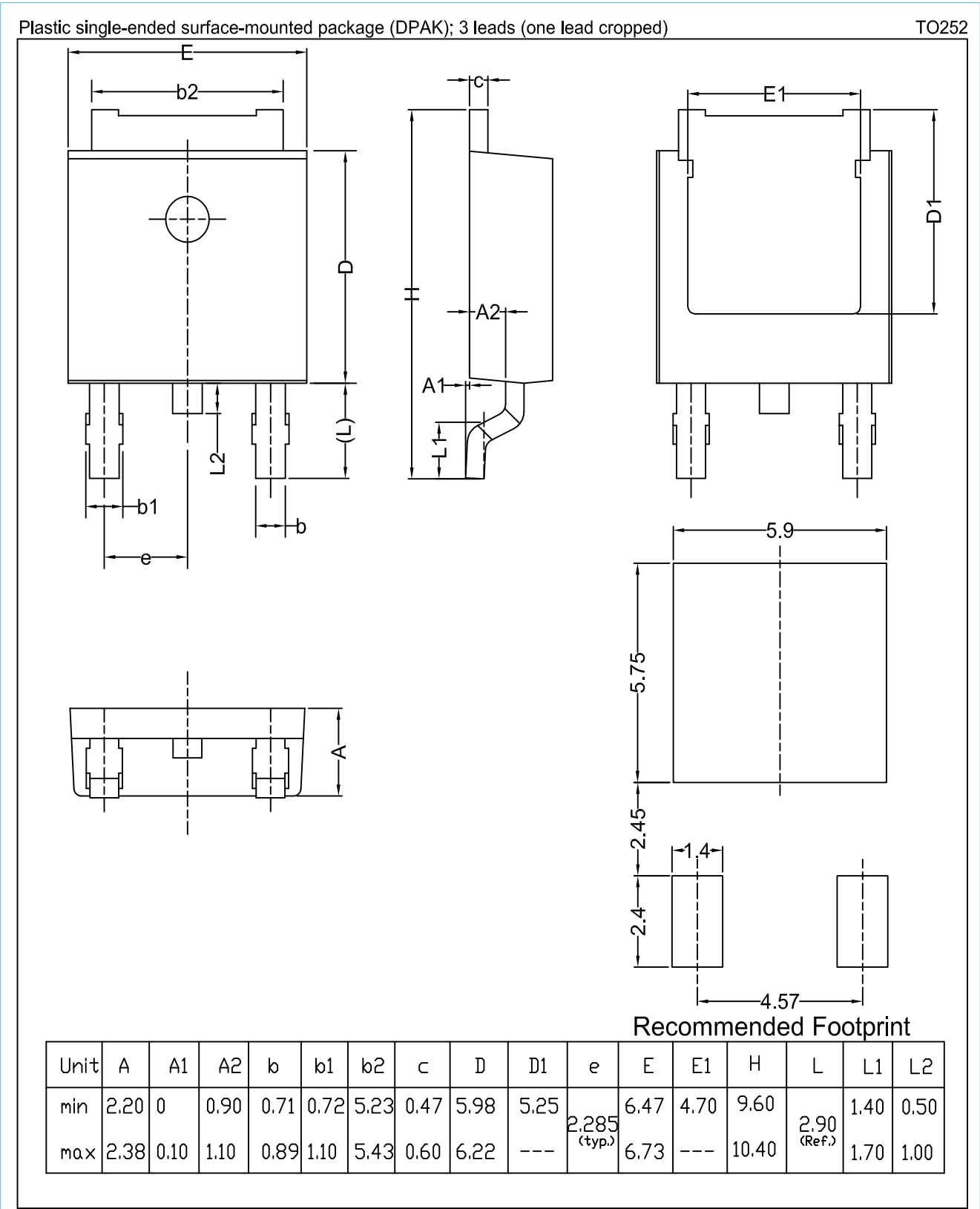


Fig. 7. Recovered charge as a function of junction temperature

10. Package outline



**Fig. 8. Package outline DPAK (TO252NS)**

NXPSC10650D

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Product data sheet

4 January 2017

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## 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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