

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

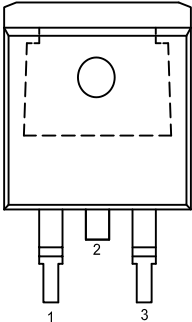

4. Quick reference data

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	$\delta = 0.5$; $T_{mb} \leq 106$ °C; square-wave pulse; Fig. 1 ; Fig. 2 ; Fig. 3 ; Fig. 4	-	-	12	A
Static characteristics						
V_F	forward voltage	$I_F = 12$ A; $T_j = 25$ °C; Fig. 6	-	1.5	1.7	V
		$I_F = 12$ A; $T_j = 150$ °C; Fig. 6	-	1.8	2.1	V

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	n.c.	not connected	 <p>D2PAK (TO263N)</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
NXPSC12650B	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	δ = 0.5 ; T _{mb} ≤ 106 °C; square-wave pulse; Fig. 1; Fig. 2; Fig. 3; Fig. 4	-	12	A
I _{FRM}	repetitive peak forward current	δ = 0.5 ; t _p = 25 μs; square-wave pulse	-	24	A
I _{FSM}	non-repetitive peak forward current	t _p = 10 ms; T _{j(init)} = 25 °C; sine-wave pulse	-	72	A
		t _p = 10 μs; T _{j(init)} = 25 °C; square-wave pulse	-	620	A
T _{stg}	storage temperature		-55	175	°C
T _j	junction temperature		-	175	°C

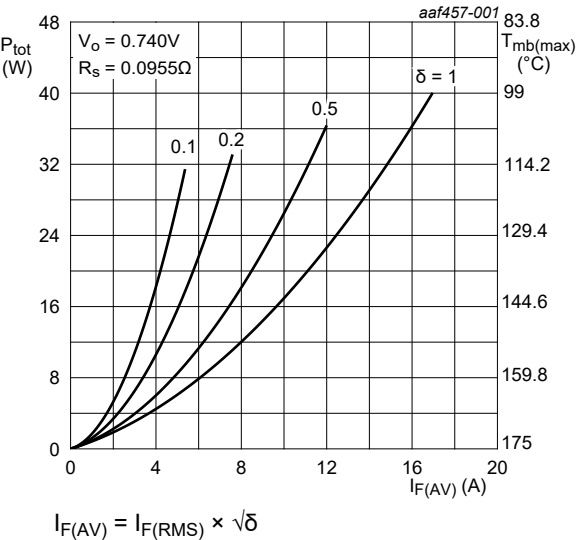


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

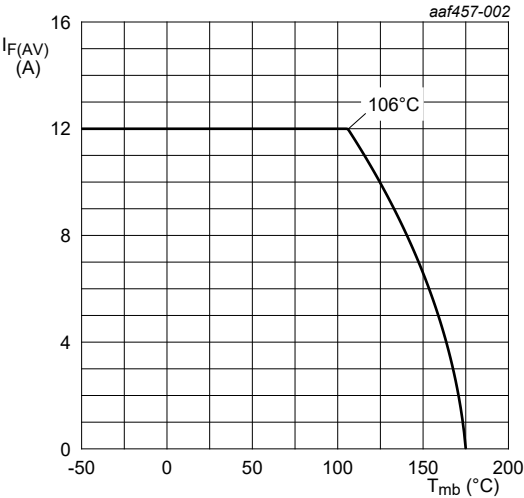


Fig. 2. Forward current as a function of mounting base temperature; maximum values

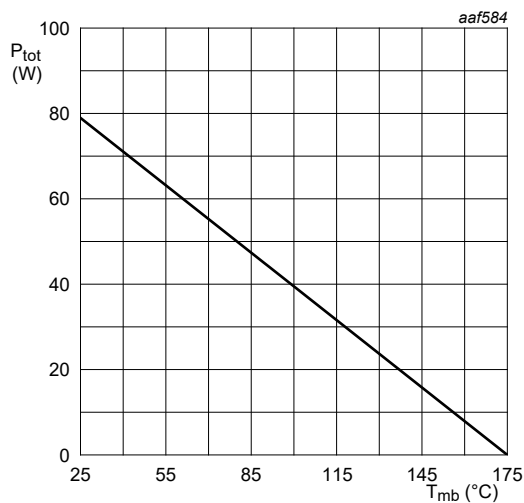


Fig. 3. Total power dissipation as a function of mounting base temperature

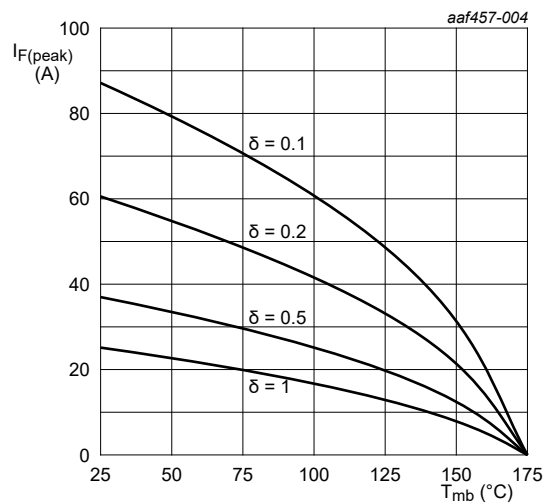


Fig. 4. Current derating as a function of mounting base temperature

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	Fig. 5	-	-	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

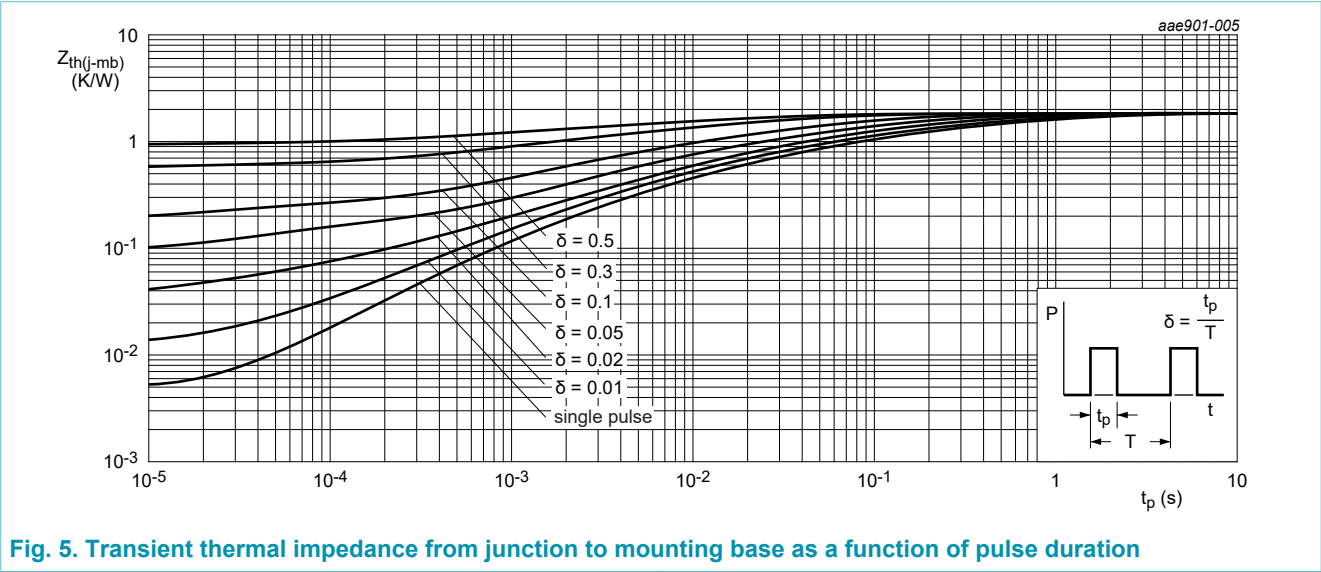
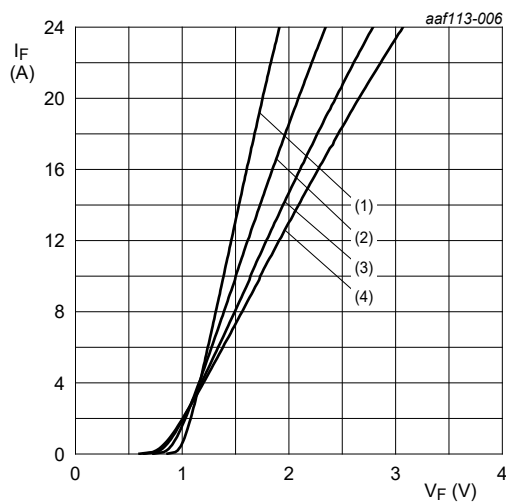


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V _F	forward voltage	I _F = 12 A; T _j = 25 °C; Fig. 6		-	1.5	1.7	V
		I _F = 12 A; T _j = 150 °C; Fig. 6		-	1.8	2.1	V
I _R	reverse current	V _R = 650 V; T _j = 25 °C		-	-	80	μA
		V _R = 650 V; T _j = 150 °C		-	-	320	μA
Dynamic characteristics							
Q _r	recovered charge	I _F = 12 A; dI _F /dt = 500 A/μs; V _R = 400 V; T _j = 25 °C; Fig. 7		-	18	-	nC
C _d	diode capacitance	f = 1 MHz; V _R = 1 V; T _j = 25 °C		-	380	-	pF
		f = 1 MHz; V _R = 300 V; T _j = 25 °C		-	60	-	pF
		f = 1 MHz; V _R = 600 V; T _j = 25 °C		-	58	-	pF



$V_o = 0.740\text{ V}$; $R_s = 0.0955\text{ }\Omega$
(1) $T_j = 25\text{ }^\circ\text{C}$; typical values
(2) $T_j = 100\text{ }^\circ\text{C}$; typical values
(3) $T_j = 150\text{ }^\circ\text{C}$; typical values
(4) $T_j = 175\text{ }^\circ\text{C}$; typical values

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

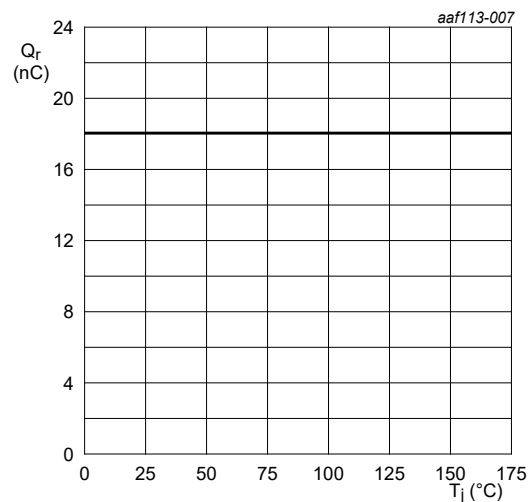


Fig. 7. Recovered charge as a function of junction temperature

10. Package outline

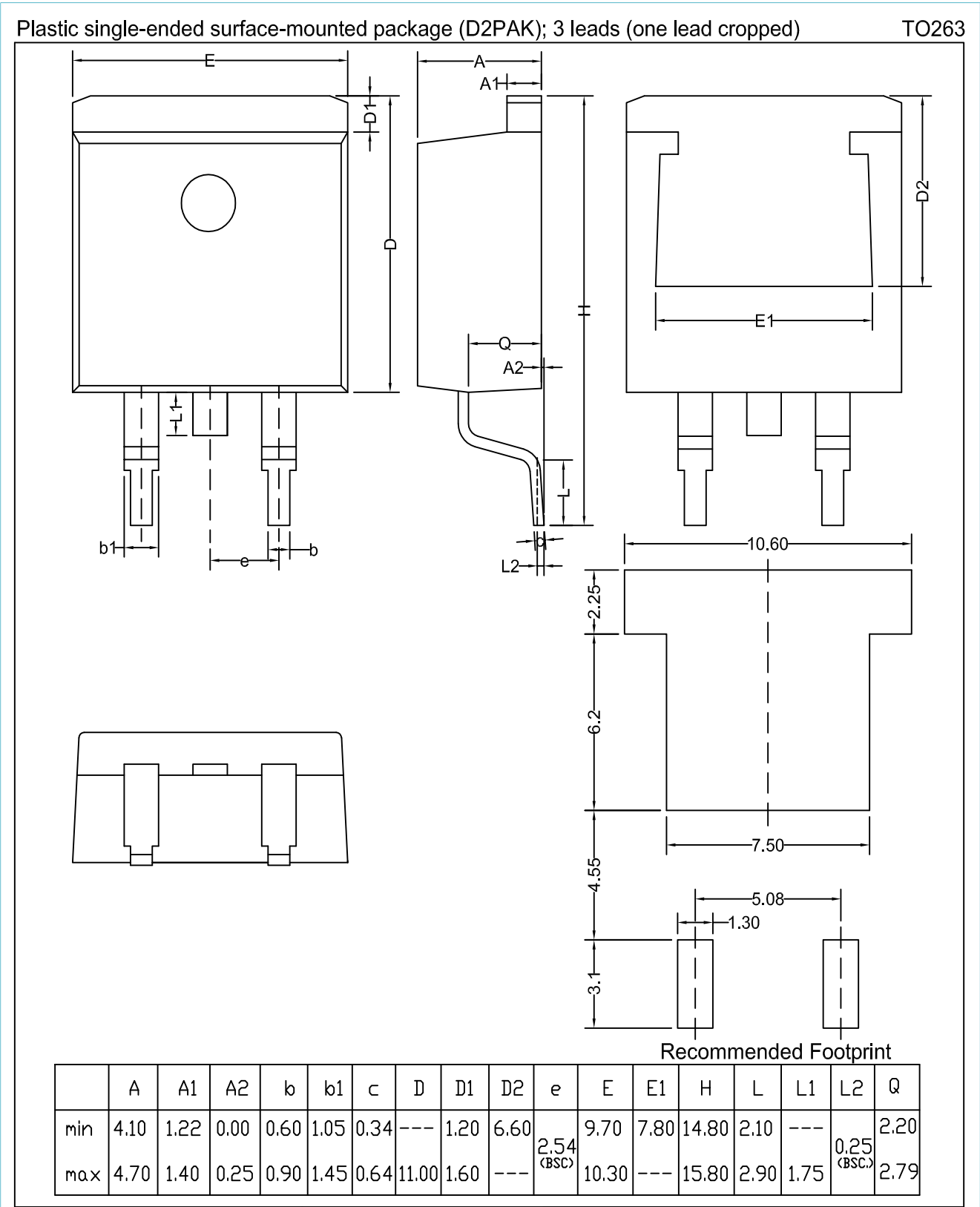


Fig. 8. Package outline D2PAK (TO263N)

11. 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.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
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- [2] The term 'short data sheet' is explained in section "Definitions".
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12. Contents

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. Limiting values..... 3

8. Thermal characteristics..... 5

9. Characteristics..... 6

10. Package outline..... 7

11. Legal information..... 8

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