WNSC6D02650D-A

Silicon Carbide Diode

Rev.01 - 7 February 2024 Product data sheet

1. General description

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

RoHS Halogen-Free

AEC - Q101 Qualified

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
- AEC-Q101 qualified

3. Applications

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

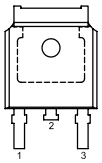
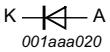
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
Absolute maximum rating							
V_{RRM}	repetitive peak reverse voltage			650			V
I_F	continuous forward current	T_{mb} ≤ 160 °C, DC; Fig. 2		2			A
T_j	junction temperature			-55 to 175			°C
Symbol	**Parameter**	**Conditions**	**Notes**	**Min**	**Typ**	**Max**	**Unit**
Static characteristics							
V_F	forward voltage	I_F = 2 A; T_j = 25 °C; Fig. 5		-	1.26	1.40	V
		I_F = 2 A; T_j = 150 °C; Fig. 5		-	1.35	1.55	V
Dynamic characteristics							
Q_r	recovered charge	I_F = 2 A; dI_F/dt = 500 A/µs; V_R = 400 V; T_j = 25 °C; Fig. 7		-	4	-	nC

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	n.c.	not connected		
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	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
WNSC6D02650D-A	TO252	WNSC6D02650D-A6J	Reel	2500	TO252NS	14-Nov-2016

7. Marking

Table 4. Marking codes

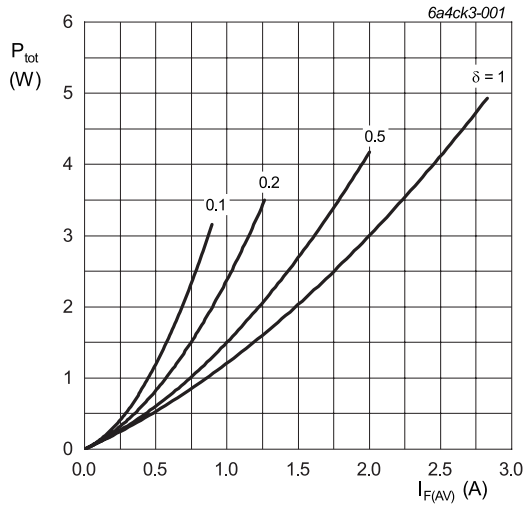
Type number	Marking codes
WNSC6D02650D-A	WNSC6D 0265DA

8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions	Notes	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	continuous forward current	$T_{mb} \leq 160$ °C, DC; Fig. 2		2	A
		$T_{mb} \leq 125$ °C, DC; Fig. 2		4.6	A
		$T_{mb} \leq 25$ °C, DC; Fig. 2		8.9	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25$ µs; $T_{mb} \leq 125$ °C; square-wave pulse		7	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse		15	A
		$t_p = 10$ µs; $T_{j(init)} = 25$ °C; square-wave pulse		220	A
I^2t	I^2t for fusing	sine-wave pulse; $T_{j(init)} = 25$ °C; $t_p = 10$ ms		1.125	A^2s
T_{stg}	storage temperature			-55 to 175	°C
T_j	junction temperature			-55 to 175	°C



$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$

$V_o = 0.916$ V; $R_s = 0.2923$ Ω

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

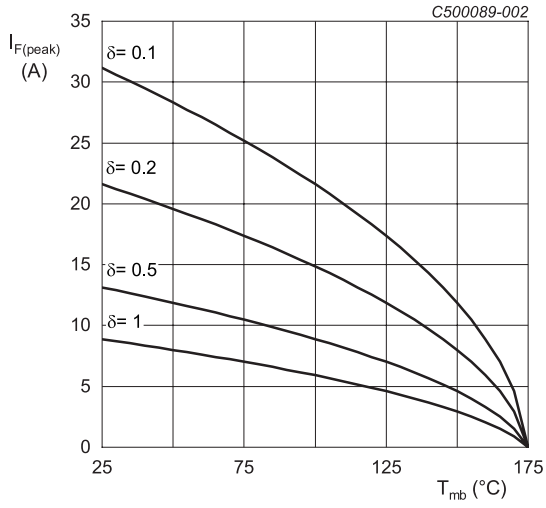


Fig. 2. Current derating as a function of mounting base temperature

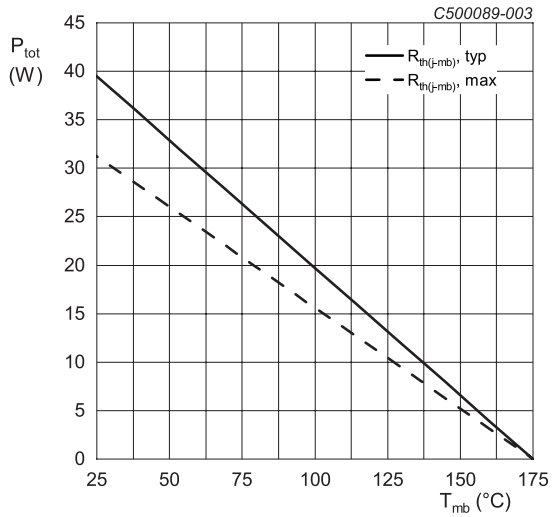


Fig. 3. Total power dissipation as a function of mounting base temperature

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	with heatsink compound; Fig. 4		-	3.8	4.8	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	60	-	K/W

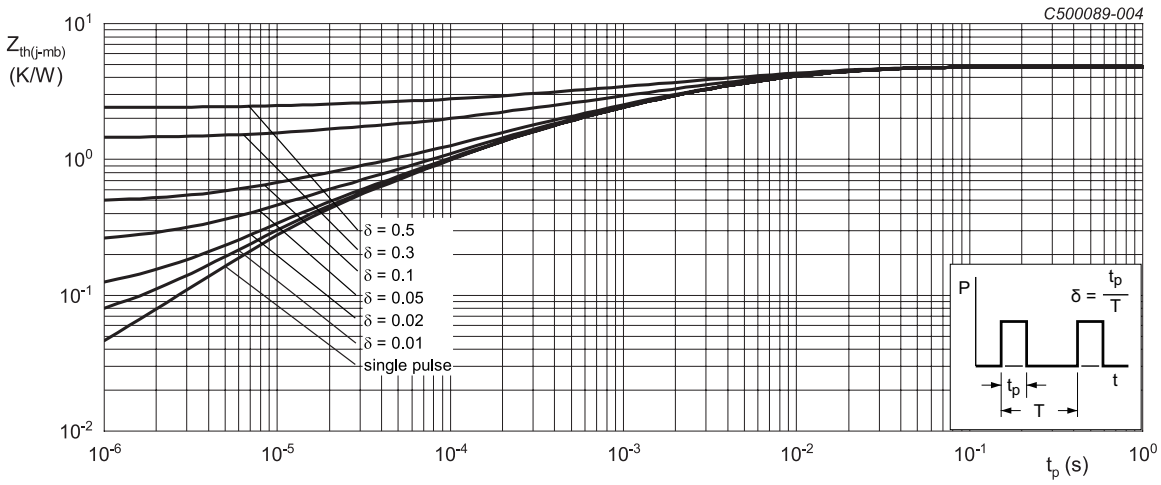
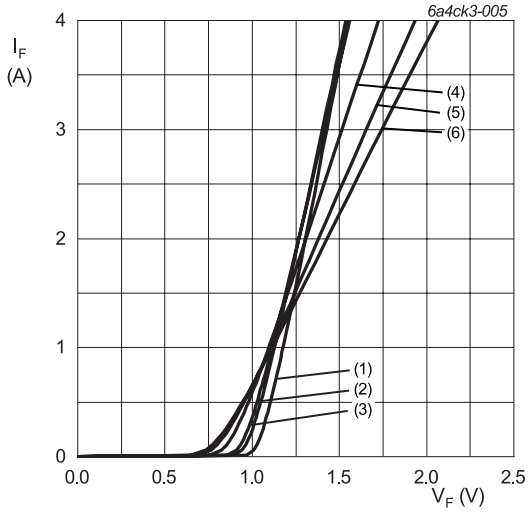


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V_F	forward current	I_F = 2 A; T_j = 25 °C; Fig. 5		-	1.26	1.40	V
		I_F = 2 A; T_j = 150 °C; Fig. 5		-	1.35	1.55	V
		I_F = 2 A; T_j = 175 °C; Fig. 5		-	1.40	1.60	V
I_R	reverse current	V_R = 650 V; T_j = 25 °C; Fig. 6		-	0.2	10	µA
		V_R = 650 V; T_j = 175 °C; Fig. 6		-	3	40	µA
Dynamic characteristics							
Q_r	recovered charge	I_F = 2 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 25 °C; Fig. 7		-	4	-	nC
C_d	diode capacitance	f = 1 MHz; V_R = 1 V; T_j = 25 °C		-	98	-	pF
		f = 1 MHz; V_R = 300 V; T_j = 25 °C		-	12	-	pF
		f = 1 MHz; V_R = 600 V; T_j = 25 °C		-	10	-	pF
E_{as}	non-repetitive avalanche energy	I_R = 2 A; L = 5 mH; $T_{j(init)}$ = 25 °C		9	-	-	mJ



V_o = 0.916 V; R_s = 0.2923 Ω
(1) T_j = -55 °C; typical values
(2) T_j = 0 °C; typical values
(3) T_j = 25 °C; typical values
(4) T_j = 100 °C; typical values
(5) T_j = 150 °C; typical values
(6) T_j = 175 °C; typical values

Fig. 5. Forward current as a function of forward voltage; typical values

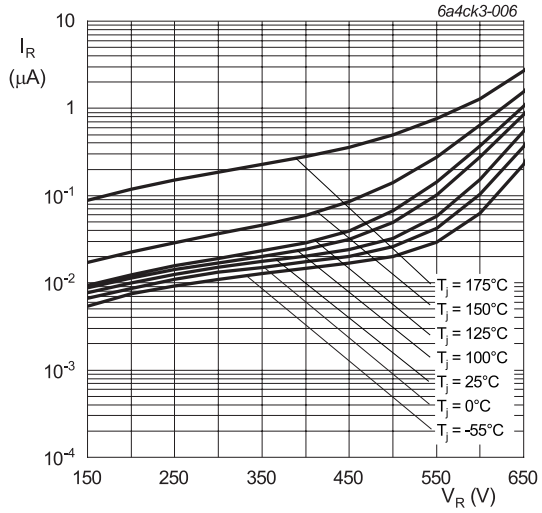


Fig. 6. Reverse leakage current as a function of reverse voltage; typical value

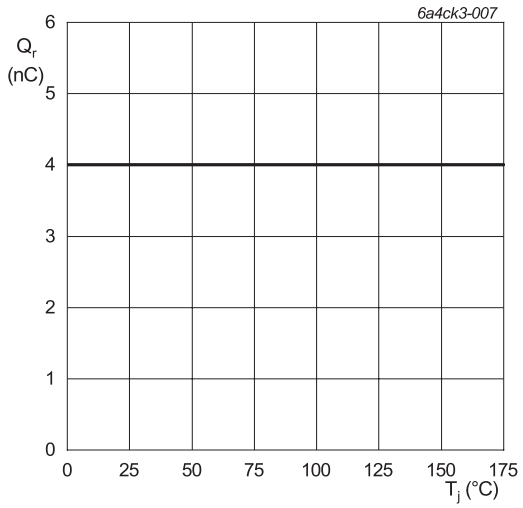
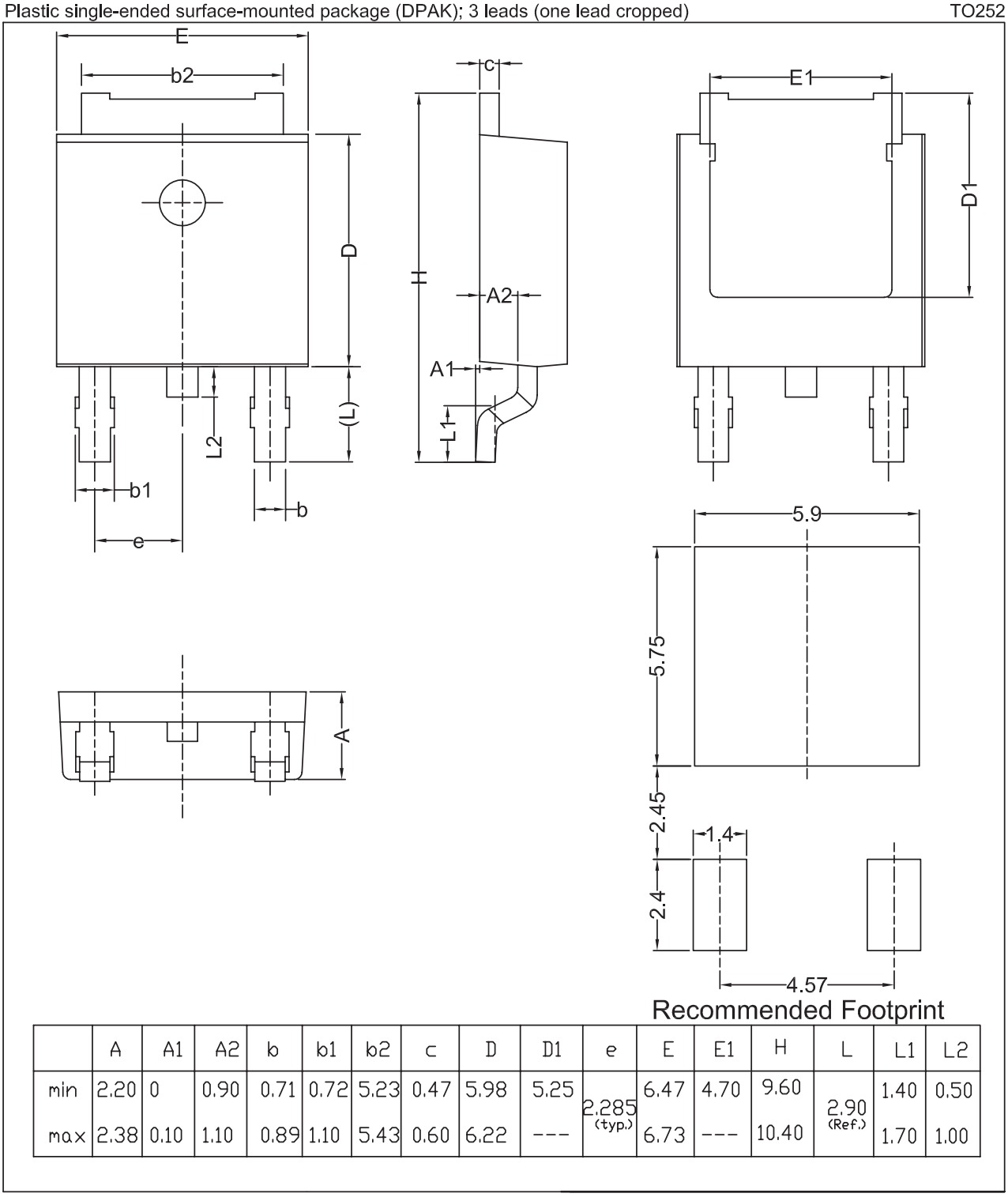


Fig. 7. Recovered charge as a function of junction temperature

11. Package outline

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



	A	A1	A2	b	b1	b2	c	D	D1	e	E	E1	H	L	L1	L2
min	2.20	0	0.90	0.71	0.72	5.23	0.47	5.98	5.25	2.285 (typ.)	6.47	4.70	9.60	2.90 (Ref.)	1.40	0.50
max	2.38	0.10	1.10	0.89	1.10	5.43	0.60	6.22	---		6.73	---	10.40		1.70	1.00

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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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