



WeEn Semiconductors

# WNSC6D10650B

Silicon Carbide Diode

Rev.01 - 11 August 2022

Product data sheet

## 1. General description

Silicon Carbide Schottky diode in a TO263 (D2PAK) plastic package, designed for high frequency switched-mode power supplies.



Halogen-Free

Lead-Free

## 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

## 3. Applications

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

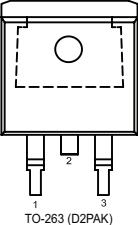
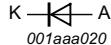
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
<b>Absolute maximum rating</b>							
$V_{RRM}$	repetitive peak reverse voltage			650			V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 147$ °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>		10			A
$T_j$	junction temperature			-55 to 175			°C
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
<b>Static characteristics</b>							
$V_F$	forward voltage	$I_F = 10$ A; $T_j = 25$ °C; <a href="#">Fig. 5</a>		-	1.29	1.45	V
		$I_F = 10$ A; $T_j = 150$ °C; <a href="#">Fig. 5</a>		-	1.45	1.65	V
<b>Dynamic characteristics</b>							
$Q_r$	recovered charge	$I_F = 10$ A; $dI_F/dt = 500$ A/μs; $V_R = 400$ V; $T_j = 25$ °C; <a href="#">Fig. 7</a>		-	24	-	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 TO263 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
WNSC6D10650B	TO263	WNSC6D10650B6J	Reel	800	TO263N	26-Sep-2016

## 7. Marking

Table 4. Marking codes

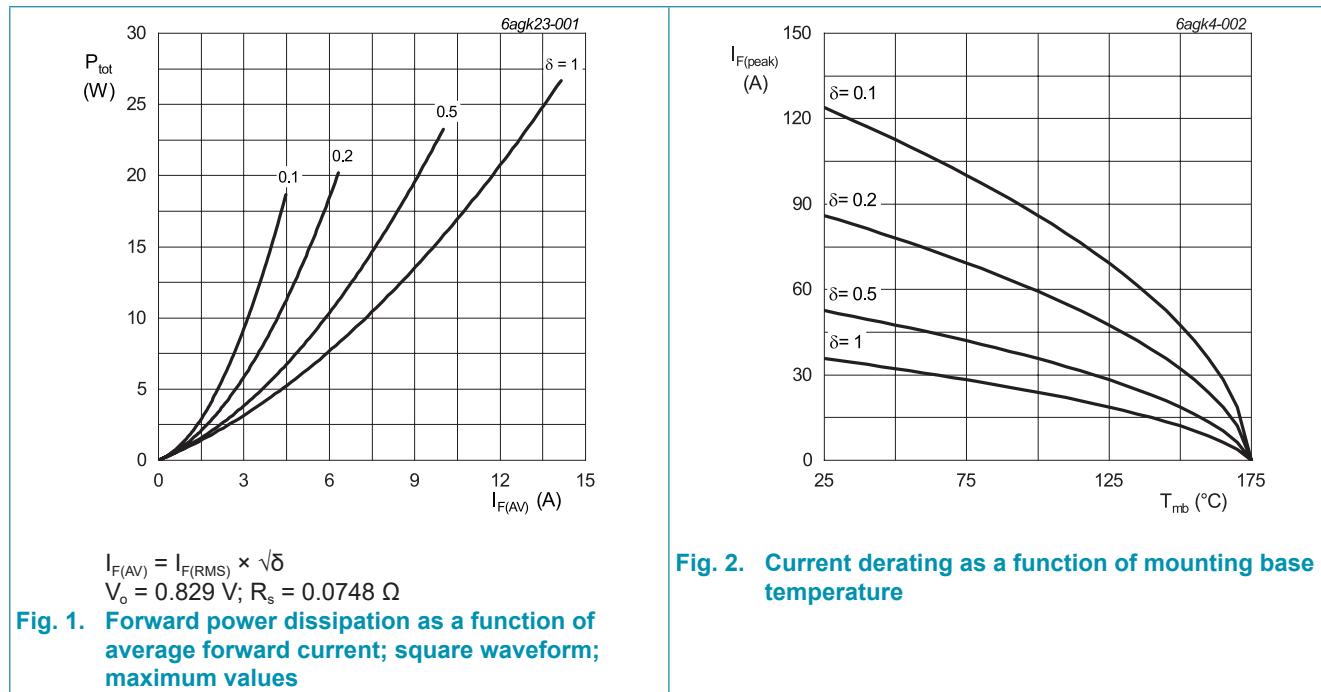
Type number	Marking codes
WNSC6D10650B	WNSC6D 10650B

## 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
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 147$ °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>		10	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25$ µs; $T_{mb} \leq 147$ °C; square-wave pulse		20	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse		80	A
		$t_p = 10$ µs; $T_{j(init)} = 25$ °C; square-wave pulse		800	A
$I^2t$	$I^2t$ for fusing	sine-wave pulse; $T_{j(init)} = 25$ °C; $t_p = 10$ ms		32	A <sup>2</sup> s
$T_{stg}$	storage temperature			-55 to 175	°C
$T_j$	junction temperature			-55 to 175	°C



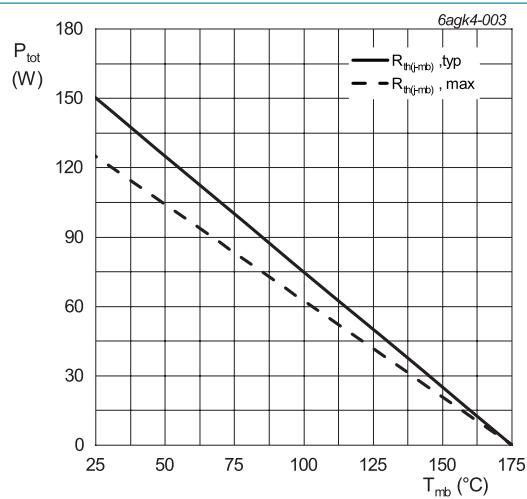


Fig. 3. Total power dissipation as a function of mounting base temperature

## 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$R_{th(j\text{-}mb)}$	thermal resistance from junction to mounting base	<a href="#">Fig. 4</a>		-	1	1.2	K/W
$R_{th(j\text{-}a)}$	thermal resistance from junction to ambient free air	in free air		-	60	-	K/W

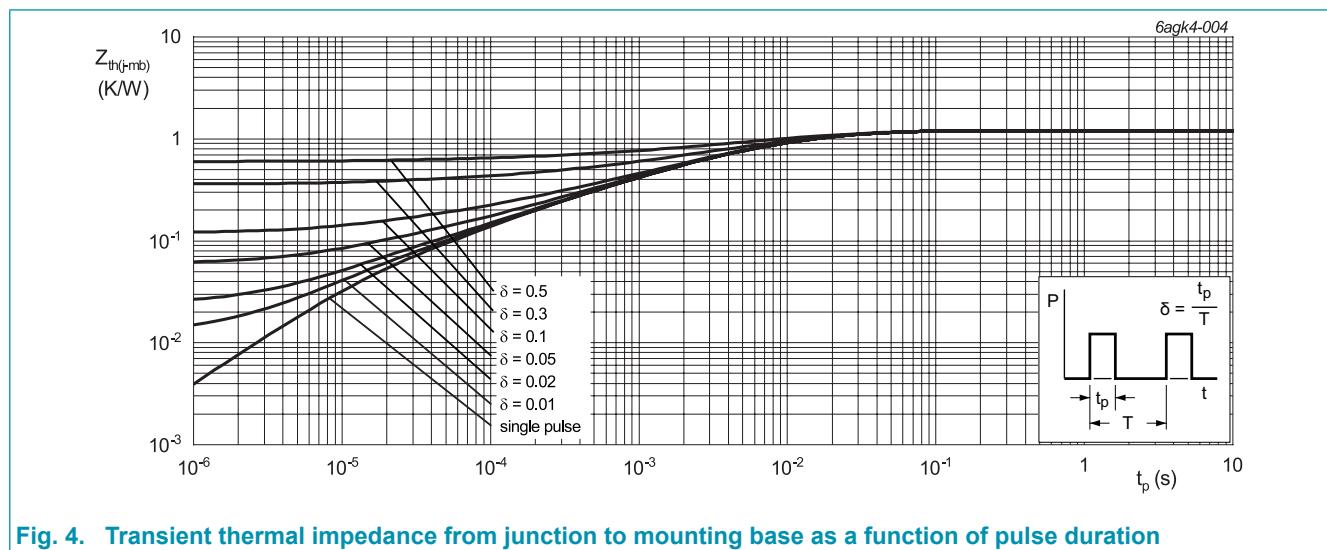
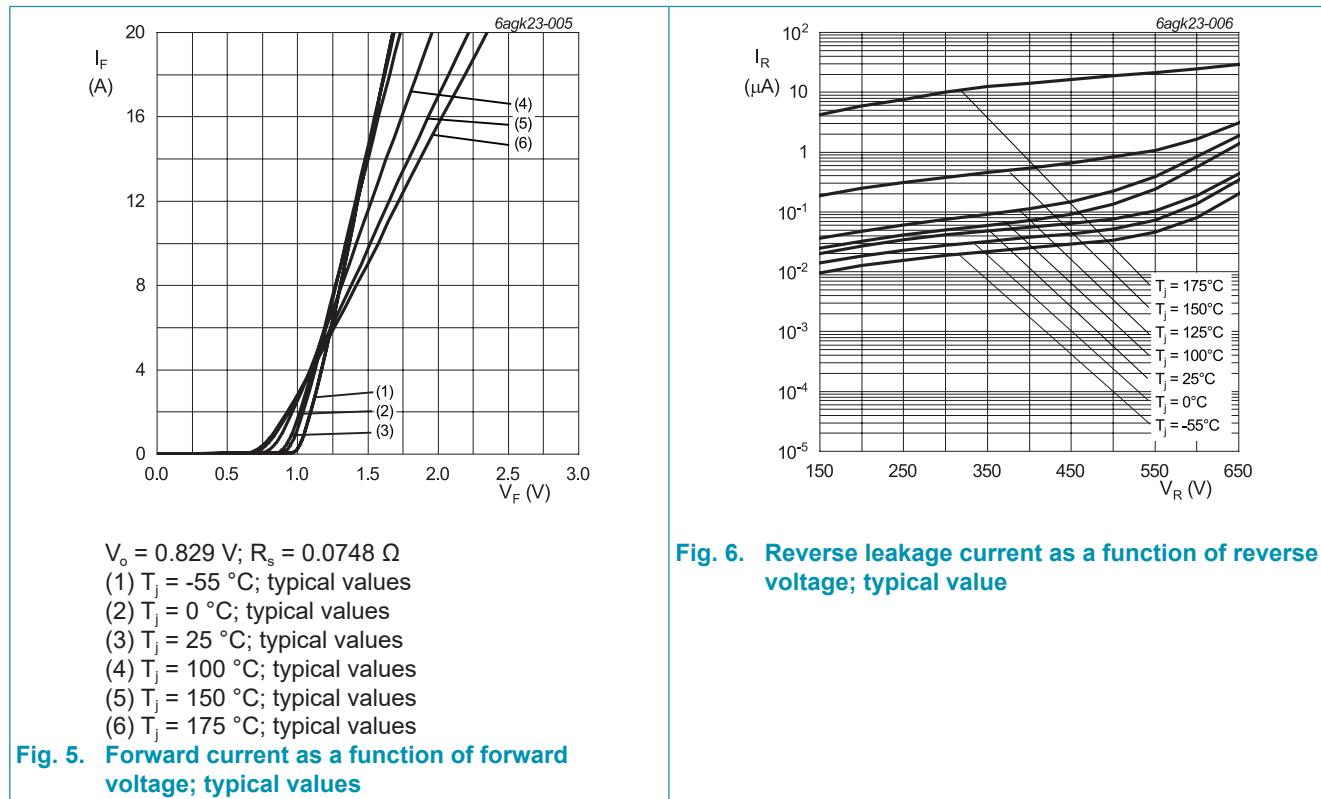


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

## 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
<b>Static characteristics</b>							
$V_F$	forward current	$I_F = 10 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$ ; <a href="#">Fig. 5</a>		-	1.29	1.45	V
		$I_F = 10 \text{ A}; T_j = 150 \text{ }^\circ\text{C}$ ; <a href="#">Fig. 5</a>		-	1.45	1.65	V
		$I_F = 10 \text{ A}; T_j = 175 \text{ }^\circ\text{C}$ ; <a href="#">Fig. 5</a>		-	1.50	1.70	V
$I_R$	reverse current	$V_R = 650 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ ; <a href="#">Fig. 6</a>		-	1	50	$\mu\text{A}$
		$V_R = 650 \text{ V}; T_j = 175 \text{ }^\circ\text{C}$ ; <a href="#">Fig. 6</a>		-	15	200	$\mu\text{A}$
<b>Dynamic characteristics</b>							
$Q_r$	recovered charge	$I_F = 10 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 500 \text{ A}/\mu\text{s}$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; <a href="#">Fig. 7</a>		-	24	-	nC
$C_d$	diode capacitance	$f = 1 \text{ MHz}; V_R = 1 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$		-	500	-	pF
		$f = 1 \text{ MHz}; V_R = 300 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$		-	58	-	pF
		$f = 1 \text{ MHz}; V_R = 600 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$		-	52	-	pF
$E_{as}$	non-repetitive avalanche energy	$I_R = 5 \text{ A}; L = 5 \text{ mH}; T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$		60	-	-	mJ



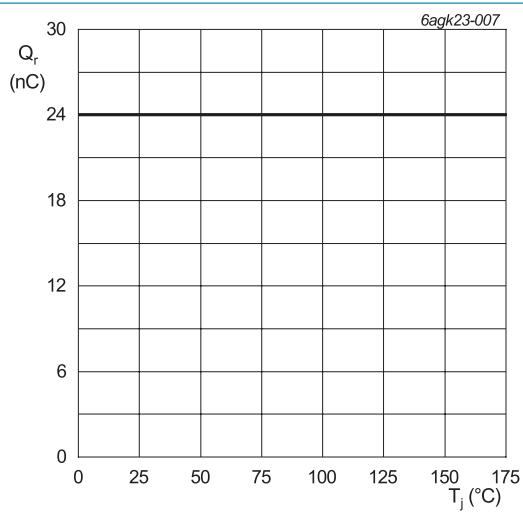
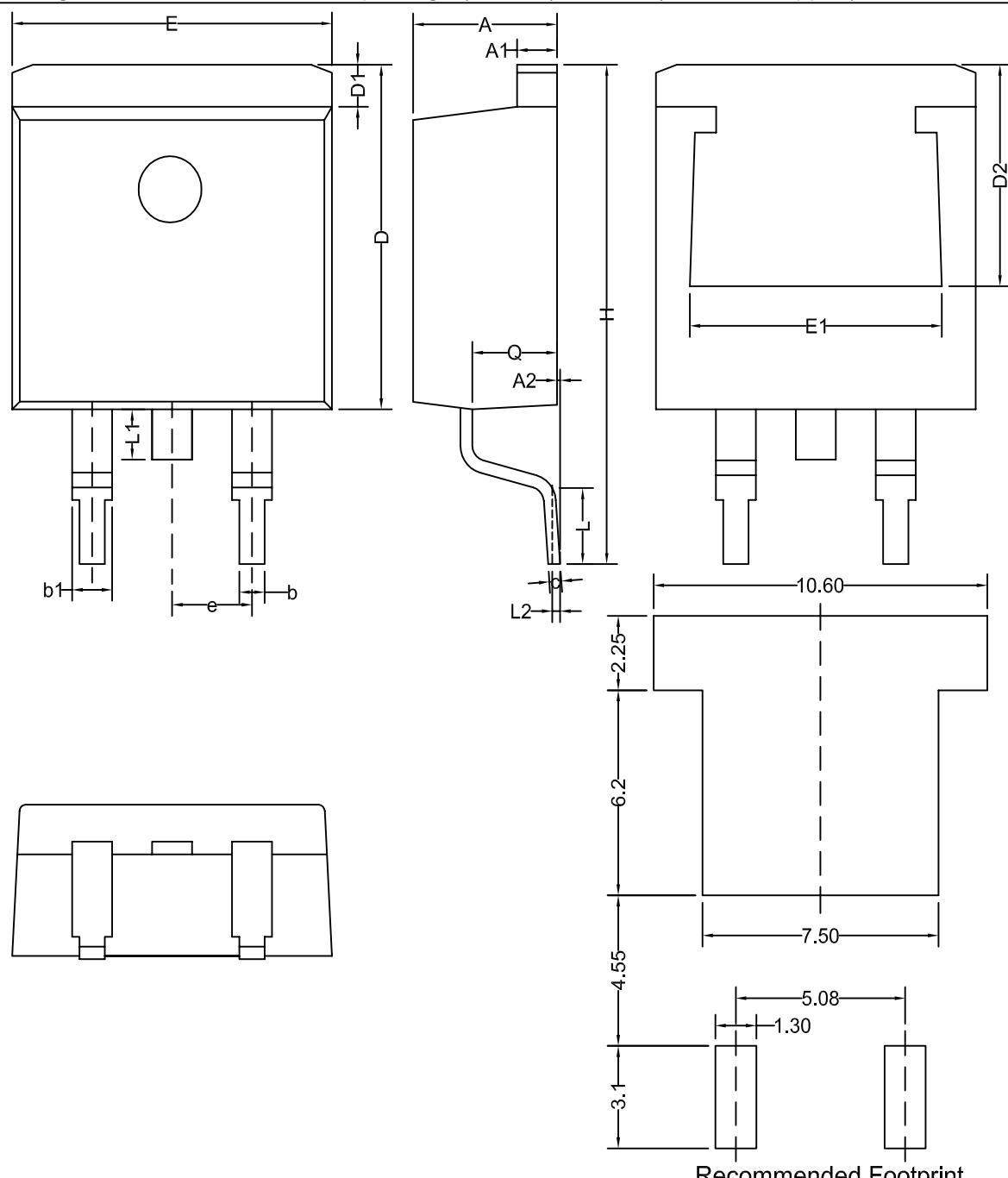


Fig. 7. Recovered charge as a function of junction temperature

## 11. Package outline

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

TO263



Recommended Footprint

Unit	A	A1	A2	b	b1	c	D	D1	D2	e	E	E1	H	L	L1	L2	Q
min	4.10	1.22	0.00	0.60	1.05	0.34	---	1.20	6.60	2.54 (BSC)	9.70	7.80	14.80	2.10	---	0.25 (BSC)	2.20
max	4.70	1.40	0.25	0.90	1.45	0.64	11.00	1.60	---	10.30	---	15.80	2.90	1.75	---	2.79	

## 12. 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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