Product data sheet

1. General description

Silicon Carbide Schottky diode in a TO220-2L plastic package, designed for high frequency switched-mode power supplies.



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	
Absolute	maximum rating						
V_{RRM}	repetitive peak reverse voltage				650		V
I _{F(AV)}	average forward current	δ = 0.5; square-wave pulse; T _{mb} ≤ 150 °C; Fig. 1; Fig. 2; Fig. 3		10		А	
T _j	junction temperature			-55 to 175		°C	
Symbol	Parameter	Conditions	Notes	Min	Тур	Max	Unit
Static ch	aracteristics						
V _F	forward voltage	I _F = 10 A; T _j = 25 °C; <u>Fig. 5</u>		-	1.29	1.45	V
		I _F = 10 A; T _j = 150 °C; <u>Fig. 5</u>		-	1.45	1.65	V
		I _F = 10 A; T _j = 175 °C; <u>Fig. 5</u>		-	1.50	1.70	V
Dynamic	characteristics		'				
Q_r	recovered charge	$I_F = 10 \text{ A}; dI_F/dt = 500 \text{ A}/\mu\text{s}; V_R = 400 \text{ V};$ $T_j = 25 ^{\circ}\text{C}; Fig. 7$		-	24	-	nC

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	mb	K 14 A
2	А	anode		K A 001aaa020
mb	mb	mounting base; connected to cathode		

6. Ordering information

Table 3. Ordering information

Type number	Package name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
WNSC6D10650	TO220-2L	WNSC6D106506Q	Tube	50	SOD59A	30-Mar-2015

7. Marking

Table 4. Marking codes

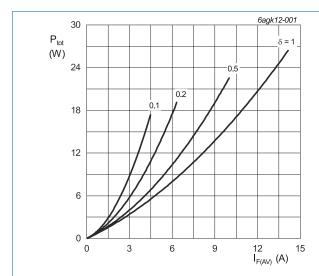
Type number	Marking codes
WNSC6D10650	WNSC6D
	10650

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	$δ$ = 0.5; square-wave pulse; $T_{mb} \le 150$ °C; Fig. 1; Fig. 2; Fig. 3		10	А
I _{FRM}	repetitive peak forward current	δ = 0.5; t _p = 25 μs; T _{mb} ≤ 150 °C; square-wave pulse		20	А
I _{FSM}	non-repetitive peak	t_p = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse		85	Α
	forward current	t _p = 10 μs; T _{j(init)} = 25 °C; square-wave pulse		800	Α
l ² t	I ² t for fusing	sine-wave pulse; $T_{j(init)}$ = 25 °C; t_p = 10 ms		36	A ² s
T _{stg}	storage temperature			-55 to 175	°C
T _j	junction temperature			-55 to 175	°C



$$\begin{split} I_{F(AV)} &= I_{F(RMS)} \times \sqrt{\delta} \\ V_o &= 0.933 \text{ V; } R_s = 0.0660 \text{ } \Omega \end{split}$$

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

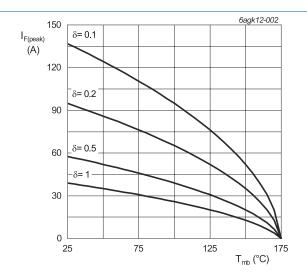
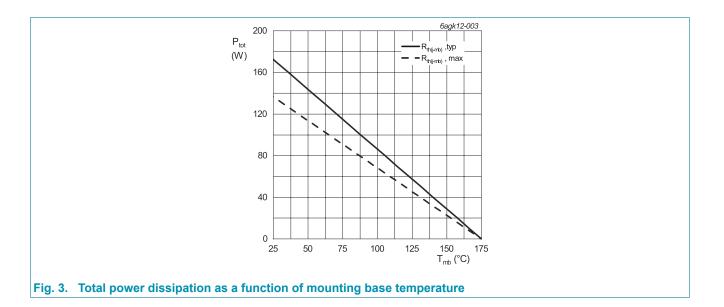


Fig. 2. Current derating as a function of mounting base temperature



9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Notes	Min	Тур	Max	Unit
R _{th(j-mb)}	thermal resistance from junction to mounting base	Fig. 4		-	0.87	1.1	K/W
$R_{\text{th(j-a)}}$	thermal resistance from junction to ambient free air	in free air		-	60	-	K/W

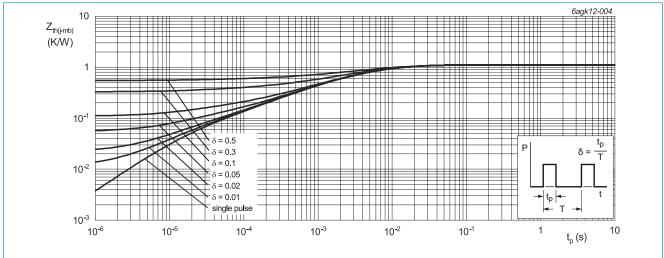
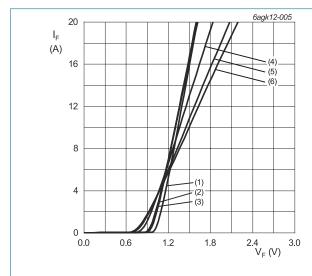


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Тур	Max	Unit
Static cha	racteristics						
V_{F}	forward current	I _F = 10 A; T _j = 25 °C; <u>Fig. 5</u>		-	1.29	1.45	V
		I _F = 10 A; T _j = 150 °C; <u>Fig. 5</u>		-	1.45	1.65	V
		I _F = 10 A; T _j = 175 °C; <u>Fig. 5</u>		-	1.50	1.70	V
I _R	reverse current	V _R = 650 V; T _j = 25 °C; <u>Fig. 6</u>		-	1	50	μA
		V _R = 650 V; T _j = 175 °C; <u>Fig. 6</u>		-	15	200	μA
Dynamic	characteristics						
Q _r	recovered charge	$I_F = 10 \text{ A}$; $V_R = 400 \text{ V}$; $dI_F/dt = 500 \text{ A}/\mu\text{s}$; $T_j = 25 \text{ °C}$; Fig. 7		-	24	-	nC
C _d	diode capacitance	f = 1 MHz; V _R = 1 V; T _j = 25 °C		-	500	-	pF
		f = 1 MHz; V _R = 300 V; T _j = 25 °C		-	58	-	pF
		f = 1 MHz; V _R = 600 V; T _j = 25 °C		-	52	-	pF
E _{as}	non-repetitive avalanche energy	$I_R = 5 \text{ A}; L = 5 \text{ mH}; T_{j(init)} = 25 \text{ °C}$		60	-	-	mJ



 V_o = 0.933 V; R_s = 0.0660 Ω

(1) $T_j = -55$ °C; typical values

(2) T_j = 0 °C; typical values

(3) T_i = 25 °C; typical values

(4) T_i = 100 °C; typical values

(5) $T_i = 150 \,^{\circ}\text{C}$; typical values

(6) T_i = 175 °C; typical values

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

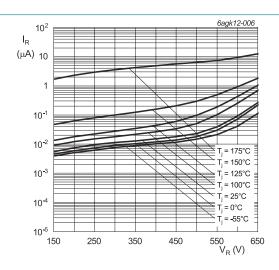
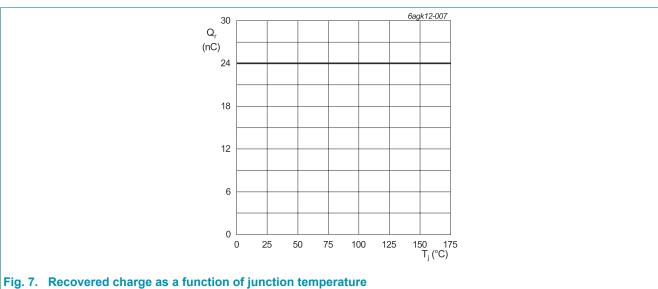
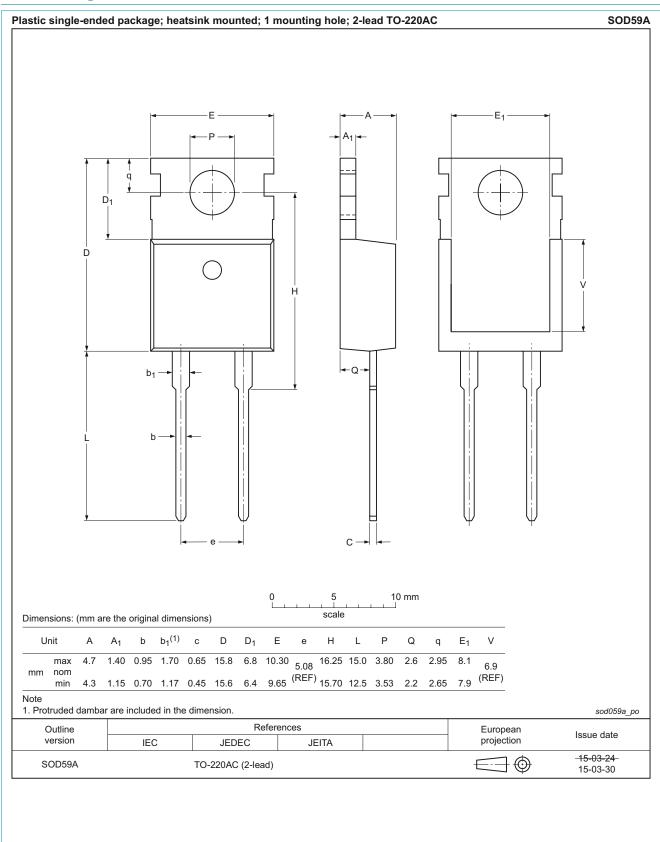


Fig. 6. Reverse leakage current as a function of reverse voltage; typical value



11. Package outline



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.
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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Date of release: 11 August 2022

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