WNSC6D30650CW-A

Silicon Carbide Diode

Rev.01 - 30 May 2023 Product data sheet

1. General description

Dual Silicon Carbide Schottky diode in a TO247 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

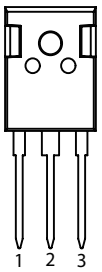
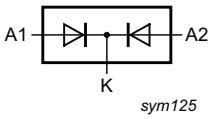
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
Absolute maximum rating							
V_{RRM}	repetitive peak reverse voltage			650			V
$I_{O(AV)}$	limiting average forward current	δ = 0.5 ; square-wave pulse; $T_{mb} \leq 135$ °C; both diodes conducting; Fig. 1; Fig. 2; Fig. 3		30			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 = 15 A; T_j = 25 °C; per diode; Fig. 5		-	1.26	1.40	V
		I_F = 15 A; T_j = 150 °C; per diode; Fig. 5		-	1.35	1.55	V
Dynamic characteristics							
Q_r	recovered charge	I_F = 15 A; dI_F/dt = 500 A/µs; V_R = 400 V; T_j = 25 °C; per diode; Fig. 7		-	36	-	nC

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode		
2	K	cathode		
3	A2	anode		
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
WNSC6D30650CW-A	TO247	WNSC6D30650CW-A6Q	Tube	30	SOT429	25-Mar-2013

7. Marking

Table 4. Marking codes

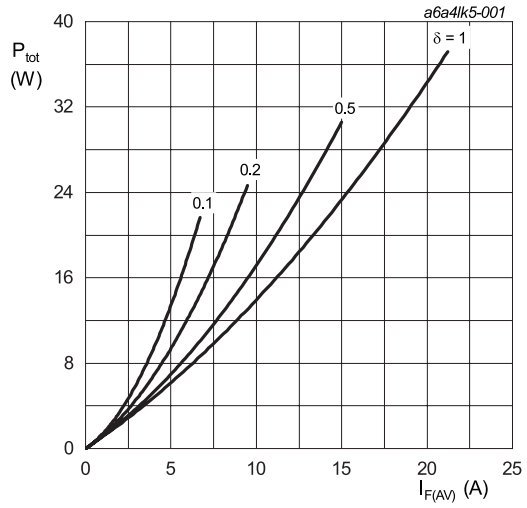
Type number	Marking codes
WNSC6D30650CW-A	WNSC6D 30650CW-A

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
$I_{O(AV)}$	limiting average forward current	δ = 0.5; square-wave pulse; $T_{mb} \leq 135$ °C; both diodes conducting; Fig. 1; Fig. 2; Fig. 3		30	A
I_{FRM}	repetitive peak forward current	δ = 0.5; t_p = 25 µs; $T_{mb} \leq 135$ °C; square-wave pulse; per diode		30	A
I_{FSM}	non-repetitive peak forward current	t_p = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; per diode		110	A
		t_p = 10 µs; $T_{j(init)}$ = 25 °C; square-wave pulse; per diode		900	A
I^2t	I^2t for fusing	sine-wave pulse; $T_{j(init)}$ = 25 °C; t_p = 10 ms		60.5	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 = 1.071 V; R_s = 0.0322 Ω

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

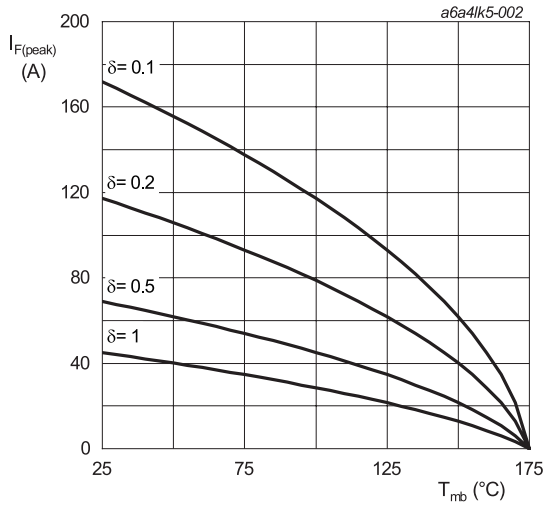


Fig. 2. Current derating as a function of mounting base temperature; per diode

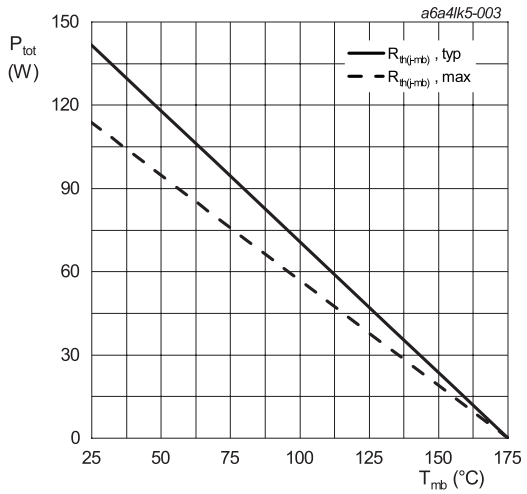


Fig. 3. Total power dissipation as a function of mounting base temperature; per diode

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	per diode; Fig. 4		-	1.06	1.32	K/W
		both diodes conducting		-	0.54	0.66	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	60	-	K/W

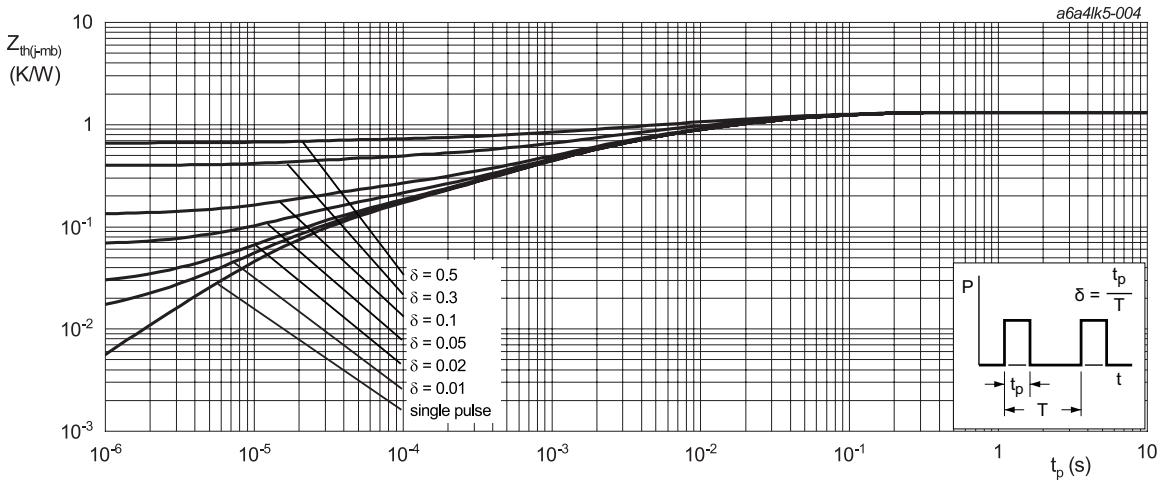
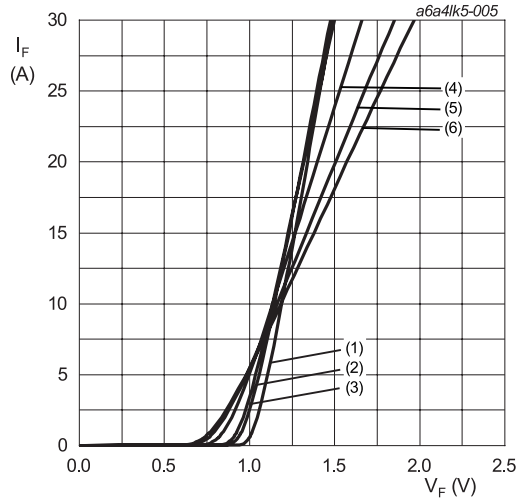


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V_F	forward current	I_F = 15 A; T_j = 25 °C; per diode; Fig. 5		-	1.26	1.40	V
		I_F = 15 A; T_j = 150 °C; per diode; Fig. 5		-	1.35	1.55	V
		I_F = 15 A; T_j = 175 °C; per diode; Fig. 5		-	1.40	1.60	V
I_R	reverse current	V_R = 650 V; T_j = 25 °C; per diode; Fig. 6		-	1	80	µA
		V_R = 650 V; T_j = 175 °C; per diode; Fig. 6		-	25	320	µA
Dynamic characteristics							
Q_r	recovered charge	I_F = 15 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 25 °C; per diode; Fig. 7		-	36	-	nC
C_d	diode capacitance	f = 1 MHz; V_R = 1 V; T_j = 25 °C; per diode		-	800	-	pF
		f = 1 MHz; V_R = 300 V; T_j = 25 °C; per diode		-	85	-	pF
		f = 1 MHz; V_R = 600 V; T_j = 25 °C; per diode		-	79	-	pF
E_{as}	non-repetitive avalanche energy	I_R = 7 A; L = 5 mH; $T_{j(init)}$ = 25 °C; per diode		120	-	-	mJ



V_o = 1.071 V; R_s = 0.0322 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; per diode

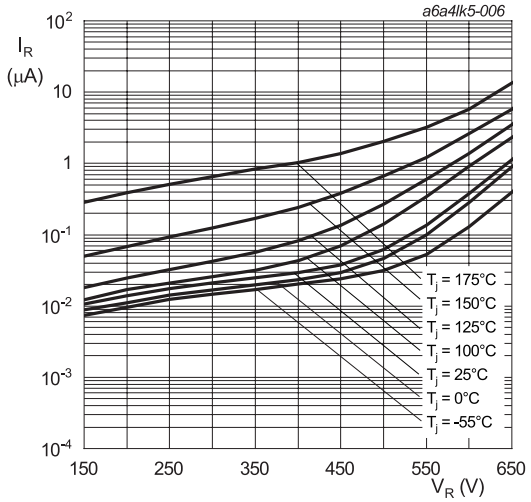


Fig. 6. Reverse leakage current as a function of reverse voltage; typical value; per diode

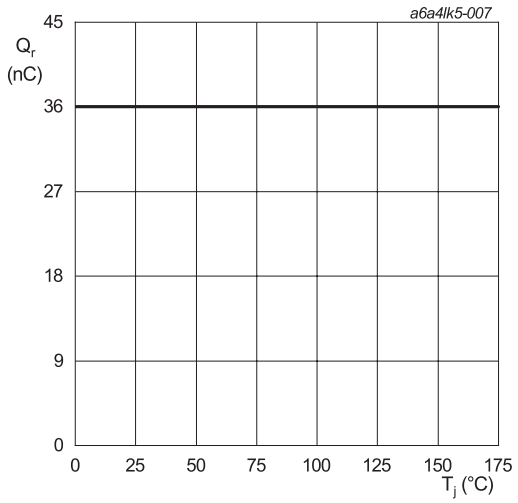
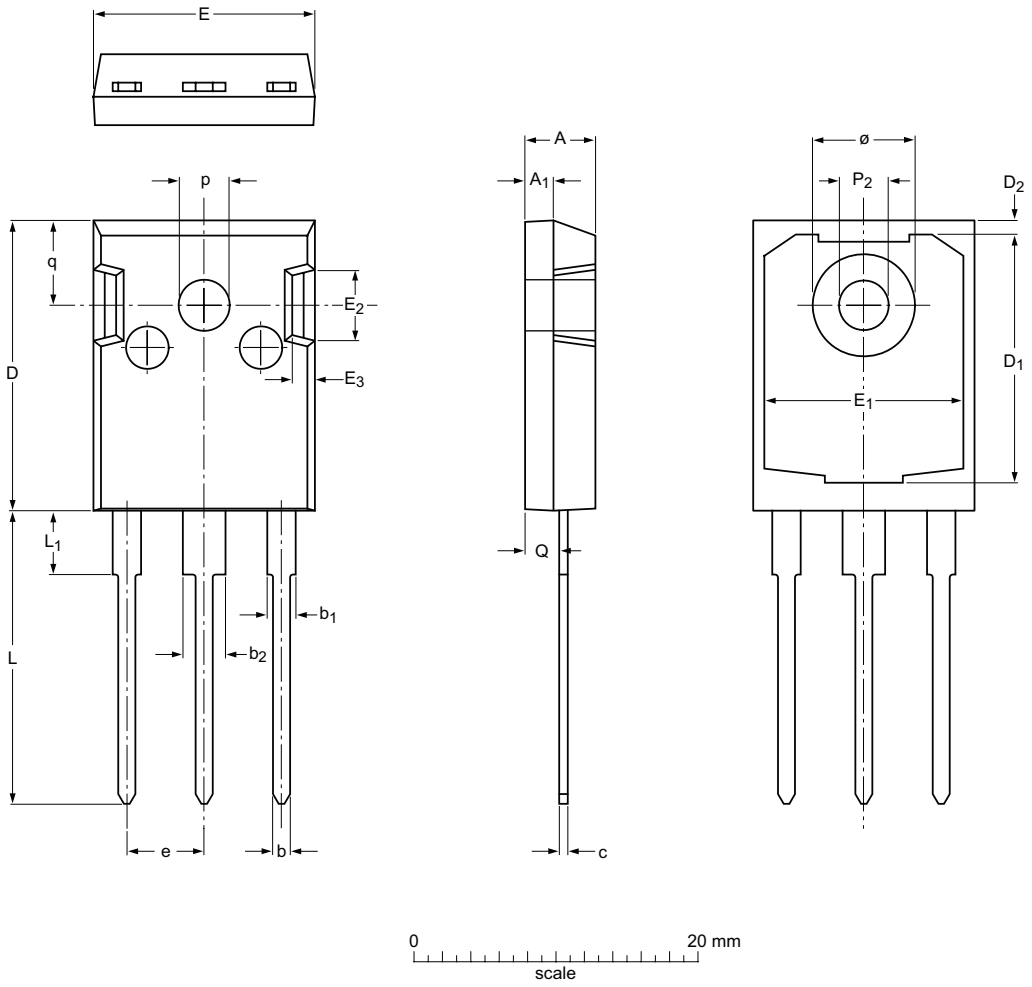


Fig. 7. Recovered charge as a function of junction temperature; per diode

11. Package outline

Plastic single-ended through-hole package; heatsink mounted; 1 mounting hole; 3-lead TO-247 **SOT429**



Dimensions (mm are the original dimensions)

Unit[1]		A	A_1	b	b_1	b_2	c	D	D_1	D_2	E	E_1	E_2	E_3	e[1]	L	L_1	P_2	p	Q	q	ø
mm	max	5.20	2.10	1.40	2.20	3.20	0.70	20.6	17.68	1.20	15.75	14.22	5.20	1.80		20.90	4.75	3.60	3.70	2.60	6.18	7.30
	nom														5.45							
	min	4.70	1.90	1.00	1.80	2.80	0.50	20.3	17.28	0.80	15.45	13.82	4.80	1.40		20.40	4.25	3.40	3.50	2.20	5.78	7.10

Note
1. Basic spacing between centers.

sot429_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT429		TO-247				~~04-09-14~~ 13-03-25

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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13. Contents

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