WNSC2D401200CW-A

Silicon Carbide Diode

Rev.01 - 09 September 2024 Product data sheet

1. General description

Dual Silicon Carbide Schottky diode in a TO247 plastic package, designed for high frequency switching mode power supplies.

RoHS Halogen-Free

AEC - Q101 Qualified

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
- High junction operating temperature capability ($T_{j(max)}$ = 175 °C)
- AEC-Q101 qualified

3. Applications

- EV On Board Chargers
- EV DC-DC converters
- Other EV HV systems

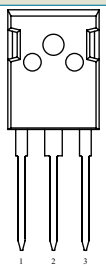
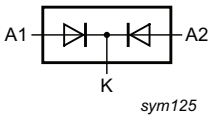
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
Absolute maximum rating							
V_{RRM}	repetitive peak reverse voltage			1200			V
I_O	limiting average forward current	T_{mb} ≤ 124 °C; DC; both diodes		40			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 = 20 A; T_j = 25 °C; per diode; Fig. 5		-	1.45	1.65	V
		I_F = 20 A; T_j = 150 °C; per diode; Fig. 5		-	1.95	2.30	V
Dynamic characteristics							
Q_r	recovered charge	I_F = 20 A; dI_F/dt = 500 A/µs; V_R = 400 V; T_j = 25 °C; per diode; Fig. 7		-	44	-	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
WNSC2D401200CW-A	TO247	WNSC2D401200CW-A6Q	Tube	30	TO247P	09-Mar-2023

7. Marking

Table 4. Marking codes

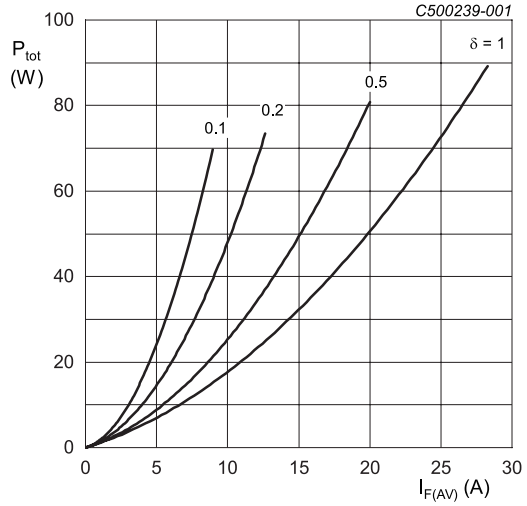
Type number	Marking codes
WNSC2D401200CW-A	WNSC2D 401200CW-A

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			1200	V
V_{RWM}	crest working reverse voltage			1200	V
V_R	reverse voltage	DC		1200	V
I_O	limiting average forward current	$T_{mb} \leq 124$ °C; DC; both diodes		40	A
		$T_{mb} \leq 125$ °C; DC; both diodes		39.6	A
		$T_{mb} \leq 25$ °C; DC; both diodes		76	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25$ µs; $T_{mb} \leq 125$ °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		190	A
		$t_p = 10$ µs; $T_{j(init)} = 25$ °C; square-wave pulse; per diode		1170	A
I^2t	I^2t for fusing	sine-wave pulse; $T_{j(init)} = 25$ °C; $t_p = 10$ ms		181	A^2s
T_{stg}	storage temperature			-55 to 175	°C
T_j	junction temperature			-55 to 175	°C



$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$
$V_o = 1.013$ V; $R_s = 0.0758$ Ω

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

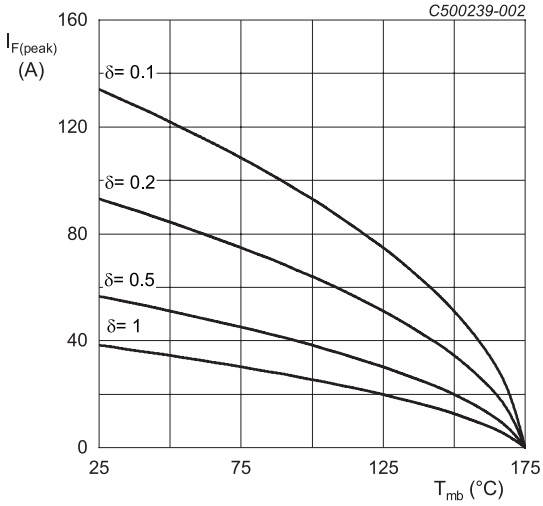


Fig. 2. Current derating as a function of mounting base temperature; per diode

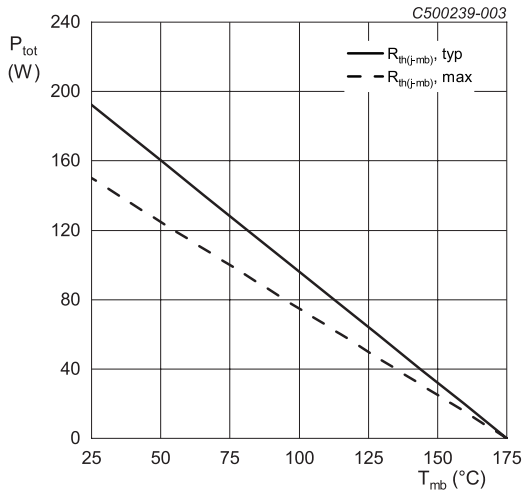


Fig. 3. Total power dissipation as a function of mounting base temperature; per diode

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		-	0.78	1	K/W
		both diodes conducting		-	0.39	0.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	40	-	K/W

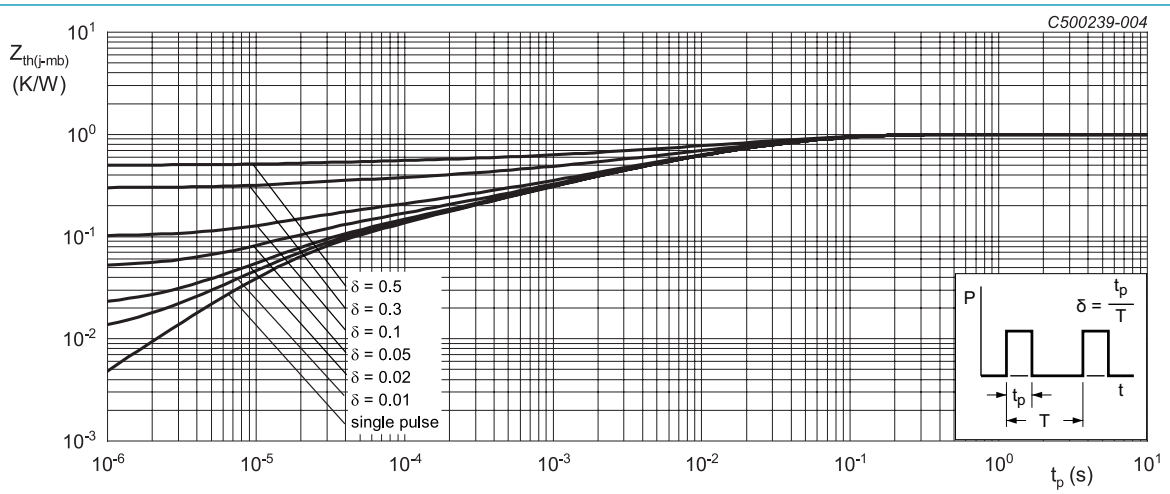
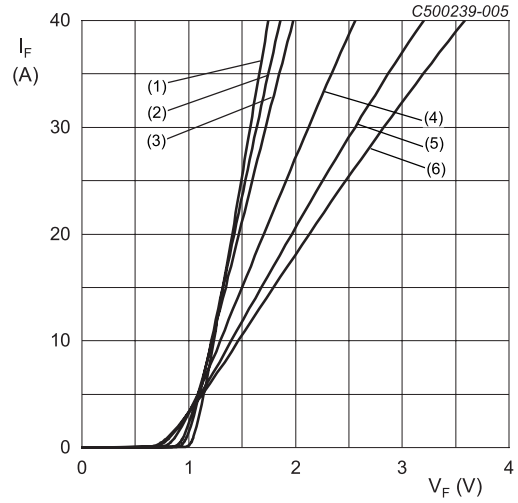


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V_F	forward voltage	I_F = 20 A; T_j = 25 °C; per diode; Fig. 5		-	1.45	1.65	V
		I_F = 20 A; T_j = 150 °C; per diode; Fig. 5		-	1.95	2.30	V
		I_F = 20 A; T_j = 175 °C; per diode; Fig. 5		-	2.10	2.60	V
I_R	reverse current	V_R = 1200 V; T_j = 25 °C; per diode; Fig. 6		-	1	100	µA
		V_R = 1200 V; T_j = 175 °C; per diode; Fig. 6		-	25	-	µA
Dynamic characteristics							
Q_r	recovered charge	I_F = 20 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 25 °C; per diode; Fig. 7		-	44	-	nC
C_d	diode capacitance	f = 1 MHz; V_R = 1 V; T_j = 25 °C		-	927	-	pF
		f = 1 MHz; V_R = 400 V; T_j = 25 °C		-	84	-	pF
		f = 1 MHz; V_R = 800 V; T_j = 25 °C		-	63	-	pF
E_{as}	non-repetitive avalanche energy	I_R = 5.3 A; L = 10 mH; $T_{j(init)}$ = 25 °C; per diode		140	-	-	mJ



V_o = 1.013 V; R_s = 0.0758 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

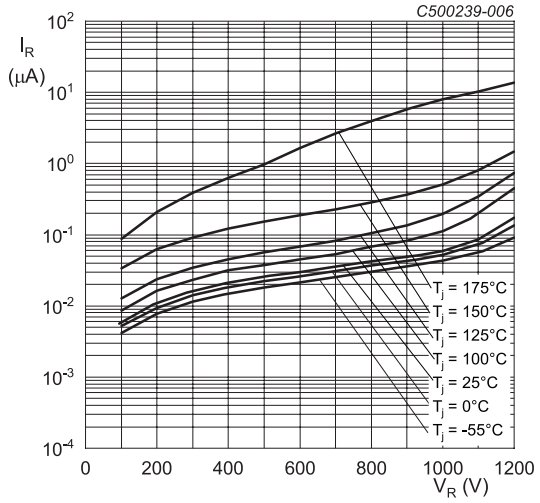


Fig. 6. Reverse leakage current as a function of reverse voltage; typical value; per diode

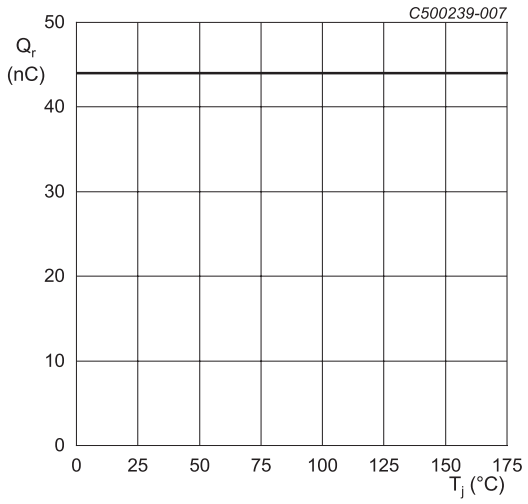
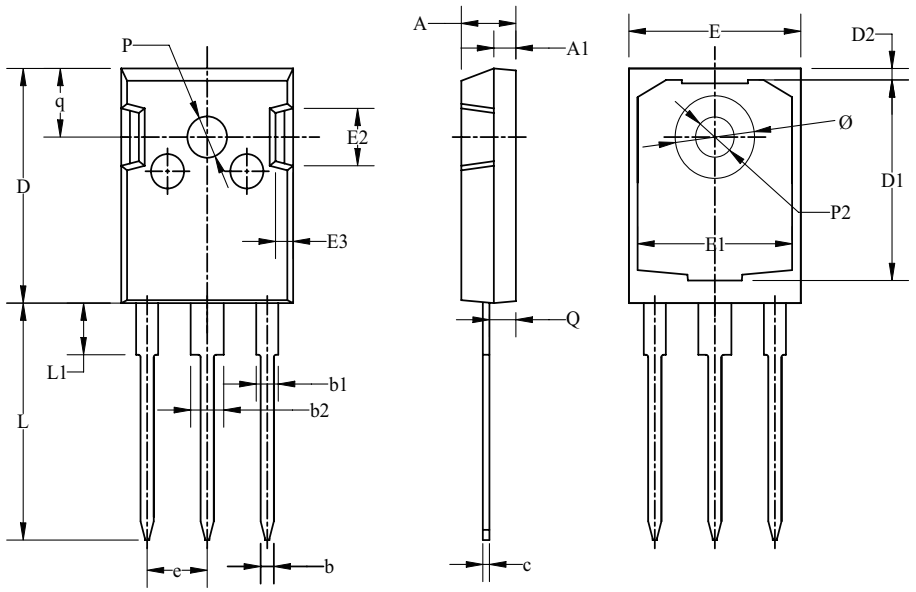


Fig. 7. Recovered charge as a function of junction temperature; per diode

11. Package outline

Plastic single-ended through-hole package; headsink mounted; 1 mounting hole; 3 leads TO-247 TO247



Dim	All Dimensions in Millimeters		
	Min	Typ	Max
A	4.70	4.95	5.20
A1	1.90	2.00	2.10
b	1.00	1.20	1.40
b1	1.80	2.00	2.20
b2	2.80	3.00	3.20
c	0.50	0.60	0.70
D	20.30	20.45	20.60
D1	17.28	17.48	17.68
D2	0.80	1.00	1.20
E	15.45	15.60	15.75
E1	13.82	14.02	14.22
E2	4.80	5.00	5.20
E3	1.40	1.60	1.80
e	5.45 BSC		
L	20.40	20.65	20.90
L1	4.25	4.50	4.75
P2	3.40	3.50	3.60
P	3.50	3.60	3.70
Q	2.20	2.40	2.60
q	5.78	5.98	6.18
Ø	7.10	7.19	7.30

12. Legal information

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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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