

## 1. General description

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



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

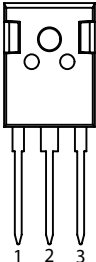
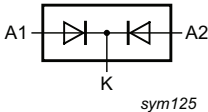
Table 1. Quick reference data

Table 17. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
Absolute maximum rating							
V <sub>RRM</sub>	repetitive peak reverse voltage			650			V
I <sub>O(AV)</sub>	limiting average forward current	δ = 0.5 ; square-wave pulse; T <sub>mb</sub> ≤ 124 °C; both diodes conducting; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>		40			A
T <sub>j</sub>	junction temperature			-55 to 175			°C
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 20 A; T <sub>j</sub> = 25 °C; per diode; <a href="#">Fig. 5</a>		-	1.26	1.40	V
		I <sub>F</sub> = 20 A; T <sub>j</sub> = 150 °C; per diode; <a href="#">Fig. 5</a>		-	1.35	1.55	V
Dynamic characteristics							
Q <sub>r</sub>	recovered charge	I <sub>F</sub> = 20 A; dI <sub>F</sub> /dt = 500 A/μs; V <sub>R</sub> = 400 V; T <sub>i</sub> = 25 °C; per diode; <a href="#">Fig. 7</a>		-	48	-	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
WNSC6D40650CW-A	TO247	WNSC6D40650CW-A6Q	Tube	30	SOT429	25-Mar-2013

7. Marking

Table 4. Marking codes

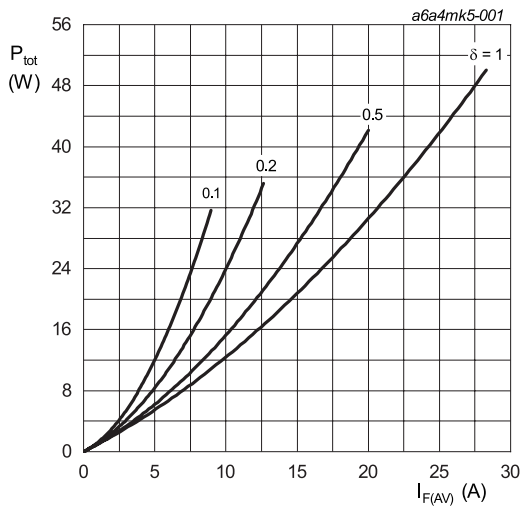
Type number	Marking codes
WNSC6D40650CW-A	WNSC6D 40650CW-A

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	$\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 124\text{ }^{\circ}\text{C}$ ; both diodes conducting; Fig. 1; Fig. 2; Fig. 3		40	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_{mb} \leq 124\text{ }^{\circ}\text{C}$ ; square-wave pulse; per diode		40	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; sine-wave pulse; per diode		140	A
		$t_p = 10\text{ }\mu\text{s}$ ; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; square-wave pulse; per diode		1000	A
$I^2t$	$I^2t$ for fusing	sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; $t_p = 10\text{ ms}$		84.5	$\text{A}^2\text{s}$
$T_{stg}$	storage temperature			-55 to 175	$^{\circ}\text{C}$
$T_j$	junction temperature			-55 to 175	$^{\circ}\text{C}$



$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$   
 $V_o = 0.950\text{ V}$ ;  $R_s = 0.0289\text{ }\Omega$

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

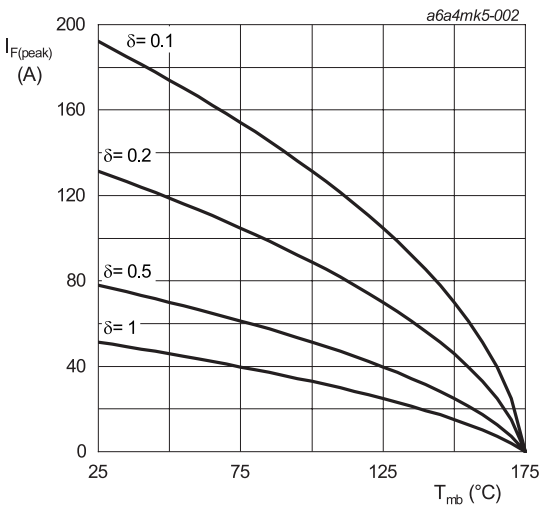


Fig. 2. Current derating as a function of mounting base temperature; per diode

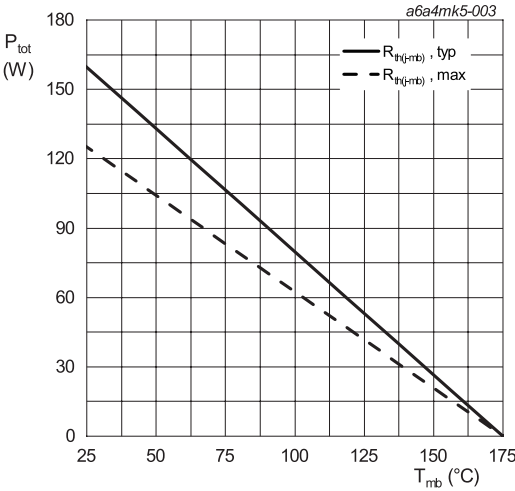


Fig. 3. Total power dissipation as a function of mounting base temperature; per diode

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		-	0.94	1.2	K/W
		both diodes conducting		-	0.48	0.6	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	60	-	K/W

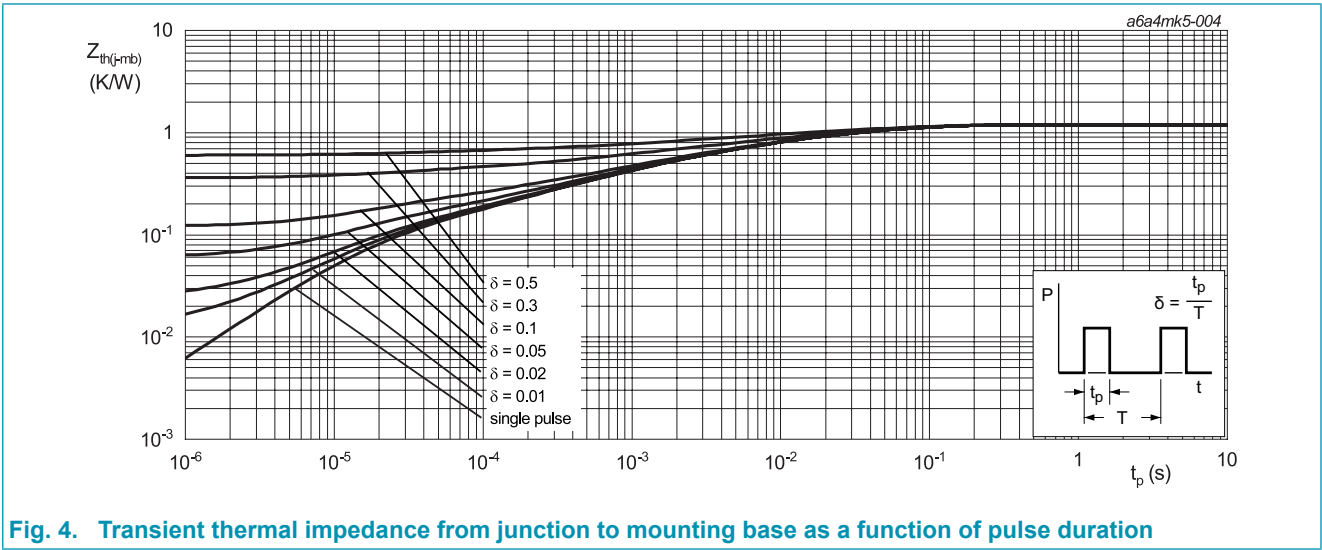
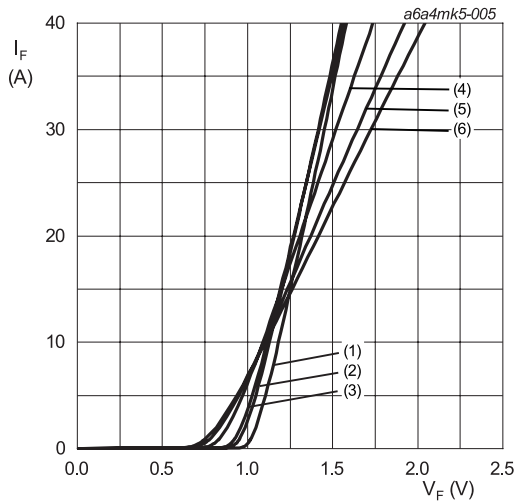


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V <sub>F</sub>	forward current	I <sub>F</sub> = 20 A; T <sub>J</sub> = 25 °C; per diode; <a href="#">Fig. 5</a>		-	1.26	1.40	V
		I <sub>F</sub> = 20 A; T <sub>J</sub> = 150 °C; per diode; <a href="#">Fig. 5</a>		-	1.35	1.55	V
		I <sub>F</sub> = 20 A; T <sub>J</sub> = 175 °C; per diode; <a href="#">Fig. 5</a>		-	1.40	1.60	V
I <sub>R</sub>	reverse current	V <sub>R</sub> = 650 V; T <sub>J</sub> = 25 °C; per diode; <a href="#">Fig. 6</a>		-	2	100	μA
		V <sub>R</sub> = 650 V; T <sub>J</sub> = 175 °C; per diode; <a href="#">Fig. 6</a>		-	30	400	μA
Dynamic characteristics							
Q <sub>r</sub>	recovered charge	I <sub>F</sub> = 20 A; V <sub>R</sub> = 400 V; dI <sub>F</sub> /dt = 500 A/μs; T <sub>J</sub> = 25 °C; per diode; <a href="#">Fig. 7</a>		-	48	-	nC
C <sub>d</sub>	diode capacitance	f = 1 MHz; V <sub>R</sub> = 1 V; T <sub>J</sub> = 25 °C; per diode		-	1045	-	pF
		f = 1 MHz; V <sub>R</sub> = 300 V; T <sub>J</sub> = 25 °C; per diode		-	115	-	pF
		f = 1 MHz; V <sub>R</sub> = 600 V; T <sub>J</sub> = 25 °C; per diode		-	100	-	pF
E <sub>as</sub>	non-repetitive avalanche energy	I <sub>R</sub> = 7.8 A; L = 5 mH; T <sub>J</sub> (init) = 25 °C; per diode		150	-	-	mJ



V<sub>o</sub> = 0.950 V; R<sub>s</sub> = 0.0289 Ω  
(1) T<sub>J</sub> = -55 °C; typical values  
(2) T<sub>J</sub> = 0 °C; typical values  
(3) T<sub>J</sub> = 25 °C; typical values  
(4) T<sub>J</sub> = 100 °C; typical values  
(5) T<sub>J</sub> = 150 °C; typical values  
(6) T<sub>J</sub> = 175 °C; typical values

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

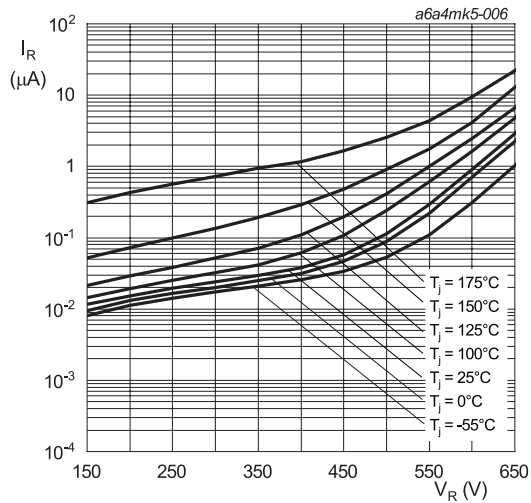


Fig. 6. Reverse leakage current as a function of reverse voltage; typical value; per diode

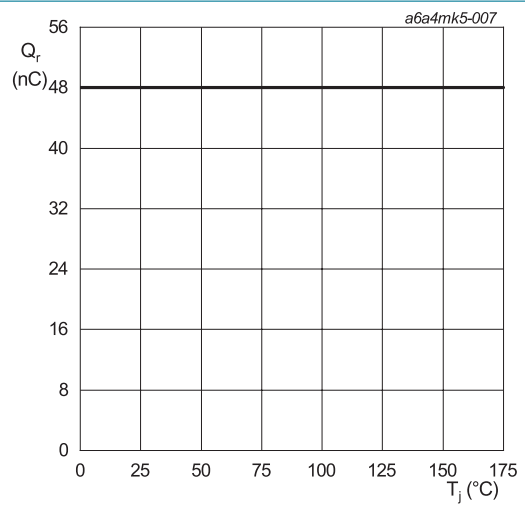
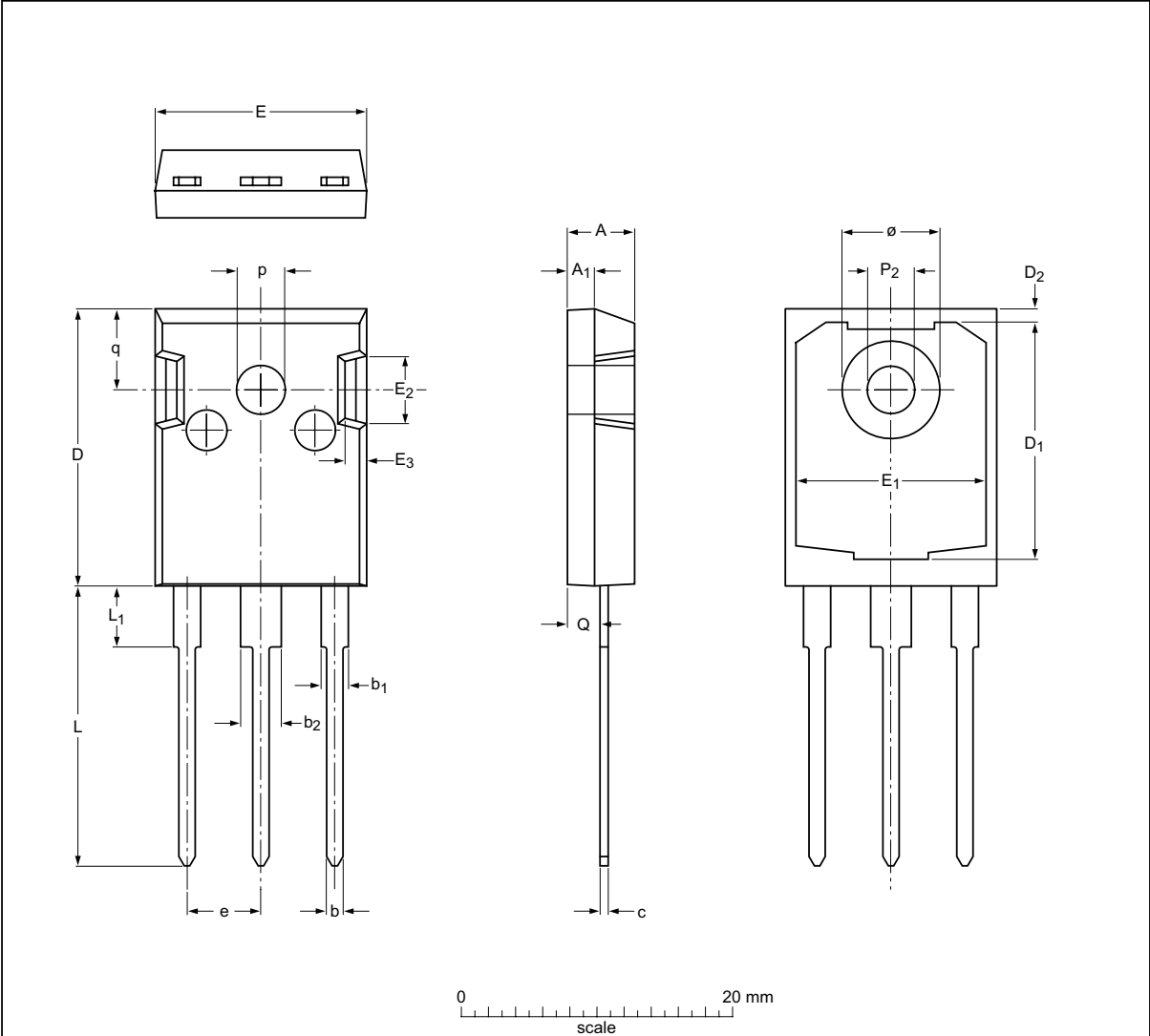


Fig. 7. Recovered charge as a function of junction temperature; per diode

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 <sup>(1)</sup>	A	A <sub>1</sub>	b	b <sub>1</sub>	b <sub>2</sub>	c	D	D <sub>1</sub>	D <sub>2</sub>	E	E <sub>1</sub>	E <sub>2</sub>	E <sub>3</sub>	e <sup>(1)</sup>	L	L <sub>1</sub>	P <sub>2</sub>	p	Q	q	ø
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	5.45	20.90	4.75	3.60	3.70	2.60	6.18	7.30
nom																					
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.
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