**Product data sheet** 

## 1. General description

Dual Silicon Carbide Schottky diode in a 3-lead TO-247 plastic package, designed for high frequency switched-mode power supplies. This product is qualified to AEC-Q101 standard for use in automotive applications.







### 2. Features and benefits

- · Highly stable switching performance
- High forward surge capability I<sub>FSM</sub>
- Extremely fast reverse recovery time
- Superior in efficiency to Silicon Diode alternatives
- · Reduced losses in associated MOSFET
- Reduced EMI
- · Reduced cooling requirements
- RoHS compliant
- AEC-Q101 compliant
- High junction operating temperature capability (T<sub>i(max)</sub> = 175 °C)

## 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	Values			Unit	
Absolute	maximum rating						
$V_{RRM}$	repetitive peak reverse voltage			6	50		V
I <sub>O(AV)</sub>	limiting average output current	$δ$ = 0.5 ; square-wave pulse; $T_{mb} \le 105$ °C; both diodes conducting; Fig. 1; Fig. 2	20		А		
$T_j$	junction temperature		175		°C		
Symbol	Parameter	Conditions		Min	Тур	Max	Unit
Static ch	aracteristics						
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 10 A; T <sub>j</sub> = 25 °C; per diode; <u>Fig. 4</u>		-	1.5	1.7	V
		I <sub>F</sub> = 10 A; T <sub>j</sub> = 150 °C; per diode; <u>Fig. 4</u>		-	1.8	2.1	V
Dynamic	characteristics				'		
Q <sub>r</sub>	recovered charge	$I_F = 10 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 500 \text{ A/}\mu\text{s};$ $T_j = 25 \text{ °C}; per diode; Fig. 6$		-	16	-	nC

# 5. Pinning information

#### **Table 2. Pinning information**

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode		A1   A2
2	K	cathode	<b>₩</b> ○ <b>५</b>	VI   14   1-
3	A2	anode		K sym125
mb	К	mounting base; connected to cathode	1 2 3	

# 6. Ordering information

### **Table 3. Ordering information**

Type number	Package name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
NXPSC20650W-A	TO247	NXPSC20650W-AQ	Tube	30	TO247N	20-Jul-2016

## 7. Marking

### **Table 4. Marking codes**

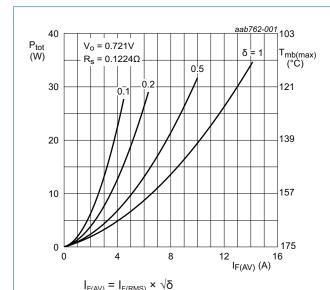
Type number	Marking codes
NXPSC20650W-A	NXPSC20650W-A

## 8. Limiting values

#### Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	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 <sub>FRM</sub>	repetitive peak forward current	$\delta$ = 0.5 ; t <sub>p</sub> = 25 μs; T <sub>mb</sub> ≤ 112 °C; square-wave pulse; per diode	20	А
I <sub>O(AV)</sub>	limiting average output current	$δ = 0.5$ ; square-wave pulse; $T_{mb} \le 105$ °C; both diodes conducting; Fig. 1; Fig. 2	20	А
I <sub>FSM</sub>	non-repetitive peak forward current	$t_p$ = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; per diode	50	А
		$t_p$ = 10 µs; $T_{j(init)}$ = 25 °C; sine-wave pulse; per diode	450	А
l <sup>2</sup> t	I <sup>2</sup> t for fusing	sine-wave pulse; $T_{j(init)}$ = 25 °C; $t_p$ = 10 ms; per diode	12.5	A <sup>2</sup> s
$T_{\text{stg}}$	storage temperature		-55 to 175	°C
T <sub>j</sub>	junction temperature		175	°C



 $I_{\text{F(AV)}} = I_{\text{F(RMS)}} \times \sqrt{\delta}$  Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values; per diode

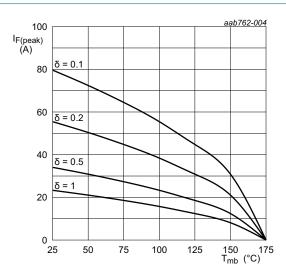


Fig. 2. Current derating as a function of mounting base temperature; per diode

### 9. Thermal characteristics

**Table 6. Thermal characteristics** 

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
$R_{th(j-mb)}$	thermal resistance	Per diode; Fig. 3	-	-	1.8	K/W
	from junction to mounting base	both diodes conducting	-	-	1	K/W
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient free air	in free air	-	45	-	K/W

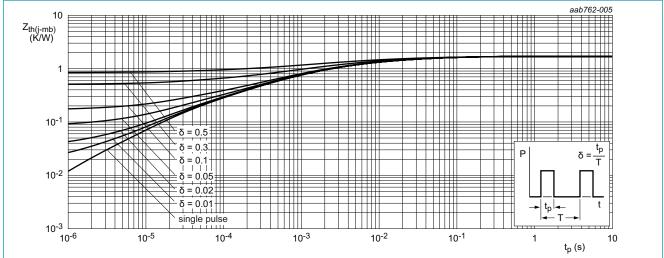
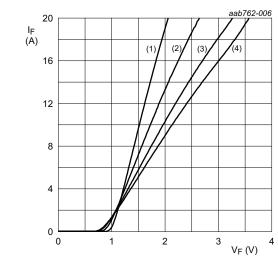


Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse duration; per diode

### 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
Static cha	racteristics					•
$V_{F}$	forward current	I <sub>F</sub> = 10 A; T <sub>j</sub> = 25 °C; per diode; <u>Fig. 4</u>	-	1.5	1.7	V
		I <sub>F</sub> = 10 A; T <sub>j</sub> = 150 °C; per diode; <u>Fig. 4</u>	-	1.8	2.1	V
I <sub>R</sub>	reverse current	$V_R = 650 \text{ V}; T_j = 25 \text{ °C}; \text{ per diode}; Fig. 5$	-	-	60	μA
		V <sub>R</sub> = 650 V; T <sub>j</sub> = 150 °C; per diode; <u>Fig. 5</u>	-	-	240	μA
Dynamic	characteristics					
Q <sub>r</sub>	recovered charge	$I_F = 10 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 500 \text{ A/}\mu\text{s};$ $T_j = 25 \text{ °C}; per diode; Fig. 6$	-	16	-	nC
C <sub>d</sub>	diode capacitance	$f = 1 \text{ MHz}$ ; $V_R = 1 \text{ V}$ ; $T_j = 25 ^{\circ}\text{C}$ ; per diode	-	328	-	pF
		f = 1 MHz; V <sub>R</sub> = 300 V; T <sub>j</sub> = 25 °C; per diode	-	44	-	pF
		f = 1 MHz; V <sub>R</sub> = 600 V; T <sub>j</sub> = 25 °C; per diode	-	42	-	pF
E <sub>as</sub>	non-repetitive avalanche energy	$I_R = 5.5 \text{ A}$ ; $T_{j(init)} = 25 \text{ °C}$ ; $L = 5 \text{ mH}$ ; per diode	75	-	-	mJ



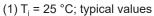


Fig. 4. Forward current as a function of forward voltage; typical values; per diode

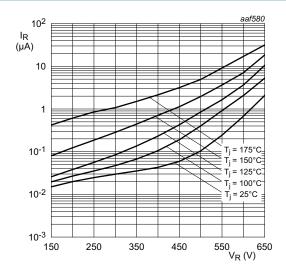
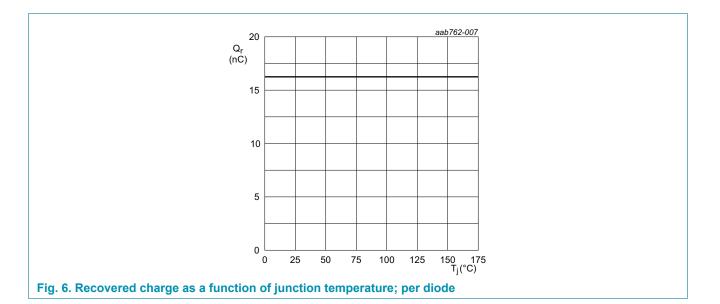


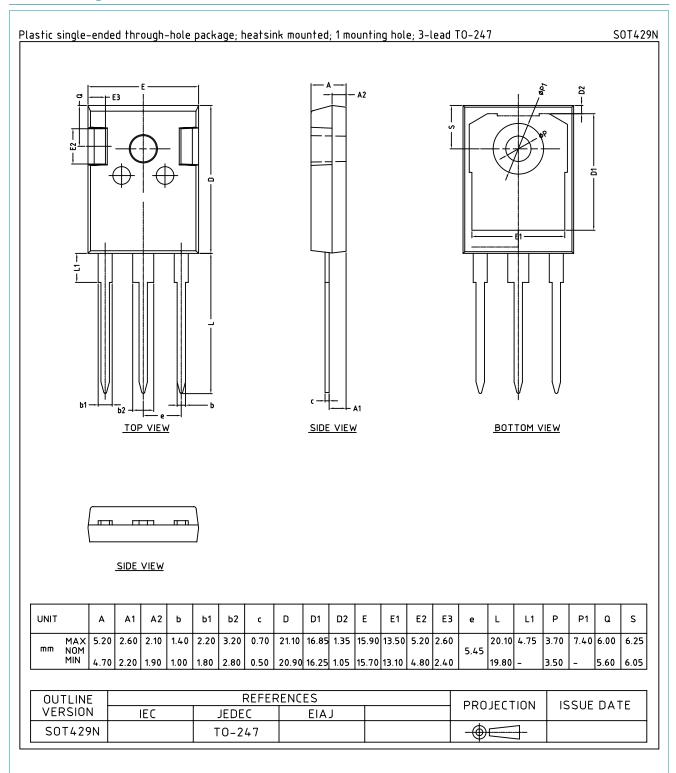
Fig. 5. Reverse leakage current as a function of reverse voltage; typical value; per diode

<sup>(2)</sup>  $T_j = 100 \,^{\circ}\text{C}$ ; typical values (3)  $T_j = 150 \,^{\circ}\text{C}$ ; typical values

<sup>(4)</sup>  $T_j = 175$  °C; typical values



## 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.
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For more information, please visit: http://www.ween-semi.com For sales office addresses, please send an email to: salesaddresses@ween-semi.com Date of release: 25 February 2019

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