

## 1. General description

Dual Silicon Carbide Schottky diode in a 3-lead TO247 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 IFSM
- 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

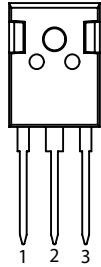
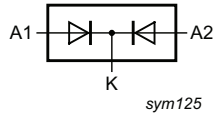
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
<b>Absolute maximum rating</b>						
$V_{RRM}$	repetitive peak reverse voltage		650			V
$I_{O(AV)}$	limiting average forward current	$\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 140$ °C; both diodes conducting; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	20			A
$T_j$	junction temperature		175			°C
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 10$ A; $T_j = 25$ °C; per diode; <a href="#">Fig. 5</a>	-	1.29	1.45	V
		$I_F = 10$ A; $T_j = 150$ °C; per diode; <a href="#">Fig. 5</a>	-	1.42	1.60	V
<b>Dynamic characteristics</b>						
$Q_r$	recovered charge	$I_F = 10$ A; $di_F/dt = 500$ A/ $\mu$ s; $V_R = 400$ V; $T_j = 25$ °C; per diode; <a href="#">Fig. 7</a>	-	24	-	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
WN6D20650CW	TO247	WN6D20650CW6Q	Tube	30	TO247N (N)	20-July-2016
					TO247P (P)	31-Mar-2023

## 7. Marking

Table 4. Marking codes

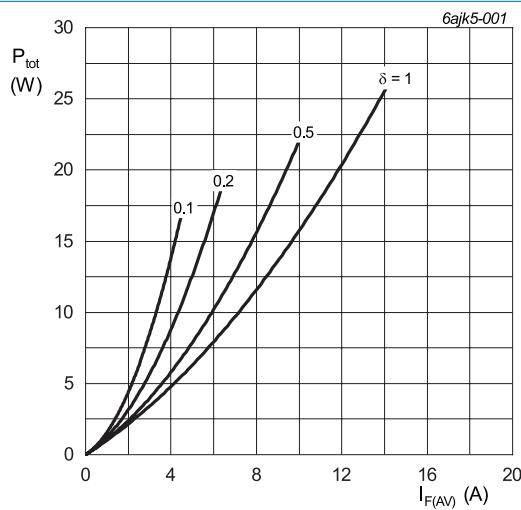
Type number	Marking codes	
	Assembly factory: N	Assembly factory: P
WN6D20650CW	WN6D 20650CW PJNxxxx xx	WN6D 20650CW PJPxxxx xx

## 8. Limiting values

**Table 5. Limiting values**

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

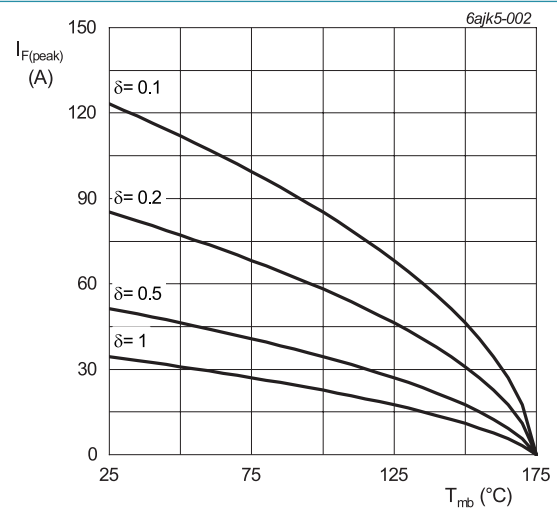
Symbol	Parameter	Conditions	Values	Unit
$V_{RRM}$	repetitive peak reverse voltage		650	V
$V_{RWM}$	crest working reverse voltage		650	V
$V_R$	reverse voltage	DC	650	V
$I_{O(AV)}$	limiting average forward current	$\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 140\text{ }^\circ\text{C}$ ; both diodes conducting; Fig. 1; Fig. 2; Fig. 3	20	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_{mb} \leq 144\text{ }^\circ\text{C}$ ; square-wave pulse; per diode	20	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	85	A
		$t_p = 10\text{ }\mu\text{s}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; square-wave pulse; per diode	800	A
$I^2t$	$I^2t$ for fusing	sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; $t_p = 10\text{ ms}$	36	$\text{A}^2\text{s}$
$T_{stg}$	storage temperature		-55 to 175	$^\circ\text{C}$
$T_j$	junction temperature		175	$^\circ\text{C}$



$$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$$

$$V_o = 0.945\text{ V}; R_s = 0.0628\text{ }\Omega$$

**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**

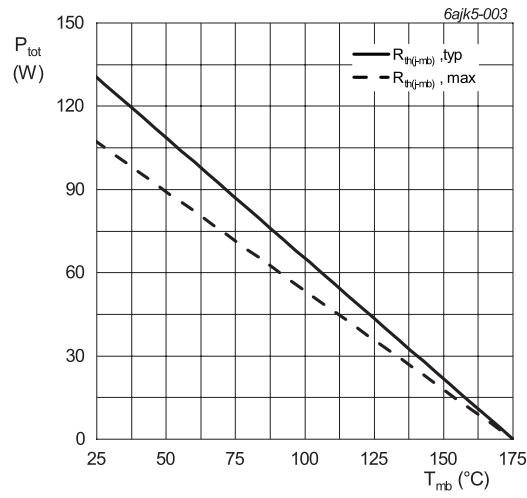


Fig. 3. Total power dissipation as a function of mounting base temperature; per diode

### 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	per diode; Fig. 4	-	1.15	1.4	K/W
		both diodes conducting	-	-	0.8	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	40	-	K/W

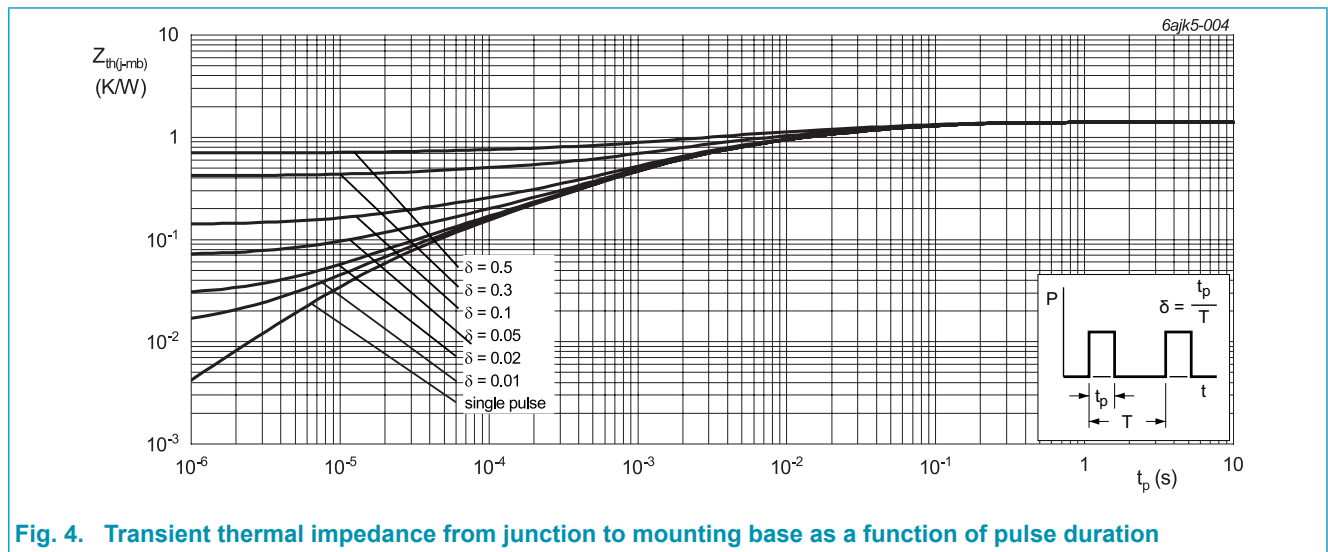
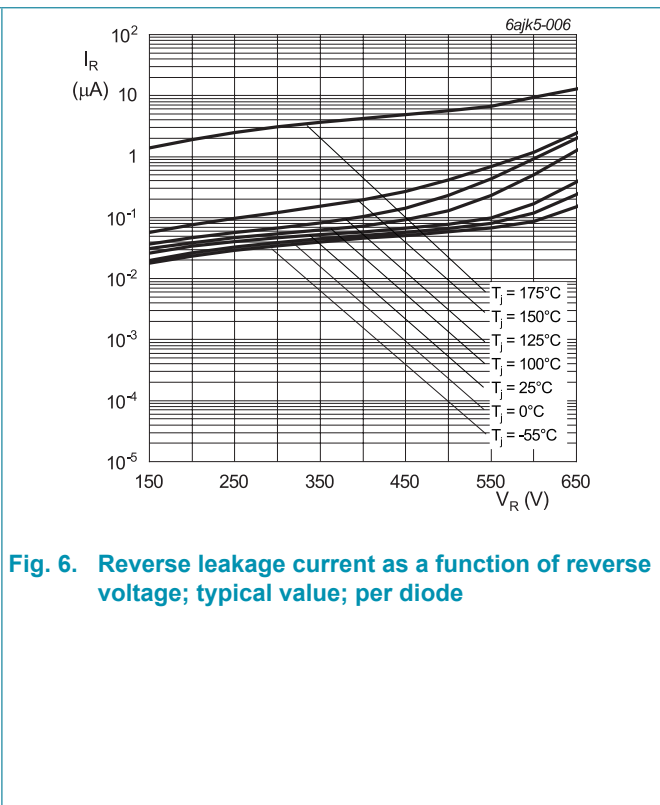
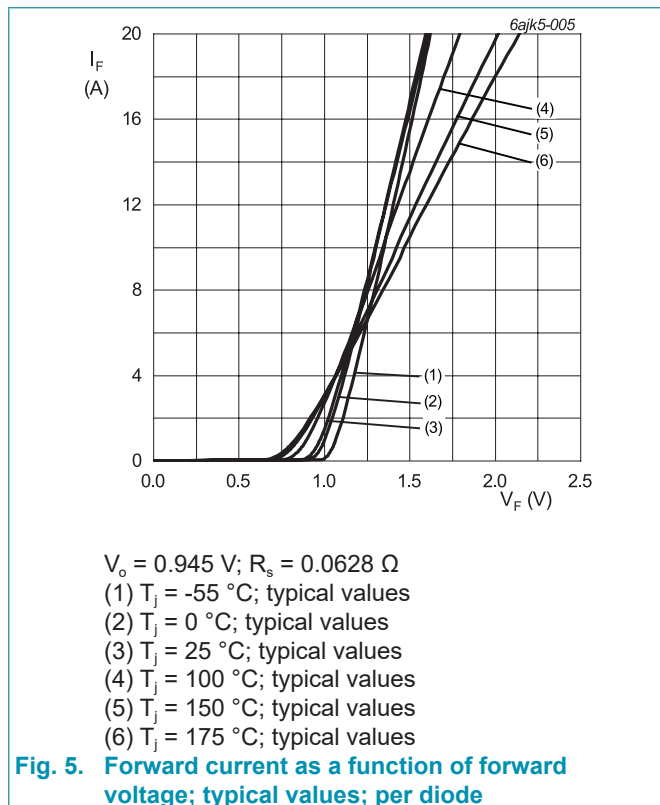


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

### 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward current	$I_F = 10\text{ A}; T_J = 25\text{ °C};$ per diode; <a href="#">Fig. 5</a>	-	1.29	1.45	V
		$I_F = 10\text{ A}; T_J = 150\text{ °C};$ per diode; <a href="#">Fig. 5</a>	-	1.42	1.60	V
		$I_F = 10\text{ A}; T_J = 175\text{ °C};$ per diode; <a href="#">Fig. 5</a>	-	1.47	1.65	V
$I_R$	reverse current	$V_R = 650\text{ V}; T_J = 25\text{ °C};$ per diode; <a href="#">Fig. 6</a>	-	1	50	$\mu\text{A}$
		$V_R = 650\text{ V}; T_J = 175\text{ °C};$ per diode; <a href="#">Fig. 6</a>	-	15	200	$\mu\text{A}$
<b>Dynamic characteristics</b>						
$Q_r$	recovered charge	$I_F = 10\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s};$ $T_J = 25\text{ °C};$ per diode; <a href="#">Fig. 7</a>	-	24	-	nC
$C_d$	diode capacitance	$f = 1\text{ MHz}; V_R = 1\text{ V}; T_J = 25\text{ °C};$ per diode	-	500	-	pF
		$f = 1\text{ MHz}; V_R = 300\text{ V}; T_J = 25\text{ °C};$ per diode	-	58	-	pF
		$f = 1\text{ MHz}; V_R = 600\text{ V}; T_J = 25\text{ °C};$ per diode	-	52	-	pF
$E_{as}$	non-repetitive avalanche energy	$I_R = 5\text{ A}; L = 5\text{ mH}; T_{j(\text{init})} = 25\text{ °C};$ per diode	60	-	-	mJ



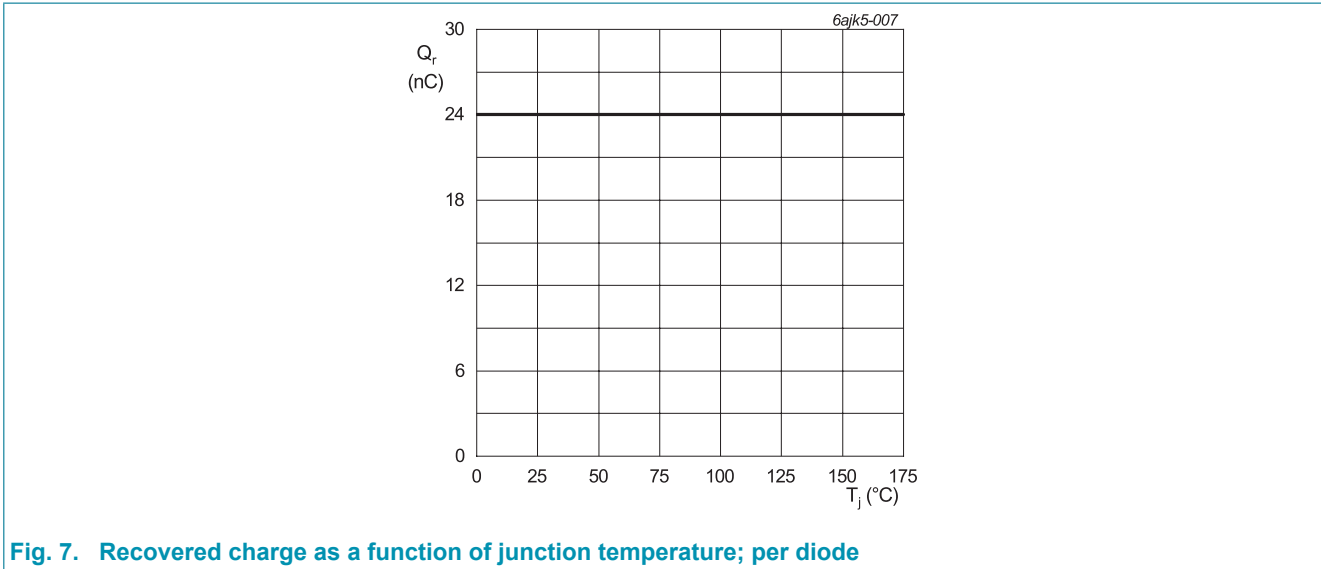


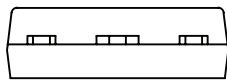
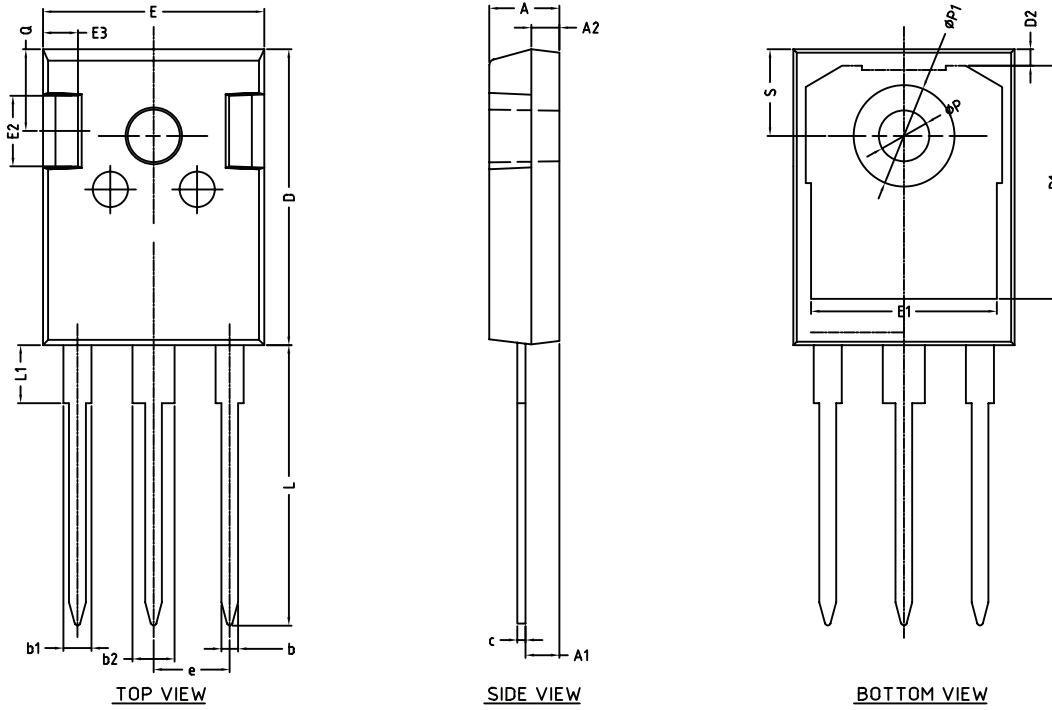
Fig. 7. Recovered charge as a function of junction temperature; per diode

### 11. Package outline

Assembly factory: N

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

SOT429N



SIDE VIEW

UNIT	A	A1	A2	b	b1	b2	c	D	D1	D2	E	E1	E2	E3	e	L	L1	P	P1	Q	S
mm	5.20	2.60	2.10	1.40	2.20	3.20	0.70	21.10	16.85	1.35	15.90	13.50	5.20	2.60	5.45	20.10	4.75	3.70	7.40	6.00	6.25
	4.70	2.20	1.90	1.00	1.80	2.80	0.50	20.90	16.25	1.05	15.70	13.10	4.80	2.40	19.80	-	3.50	-	5.60	6.05	

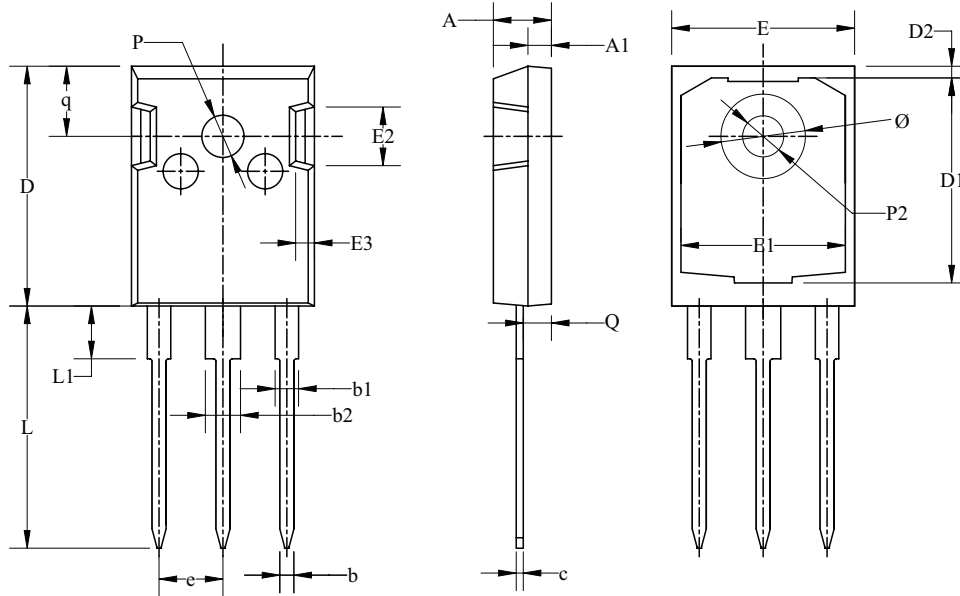
OUTLINE VERSION	REFERENCES				PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT429N		TO-247				



Assembly factory: P

Plastic single-ended through-hole pack age; 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

### 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.
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