

## 1. General description

Dual Silicon Carbide Schottky diodes in a TO3PF plastic package, designed for high frequency switched-mode power supplies.



## 2. Features and benefits

- Highly stable switching performance
- Extremely fast reverse recovery time
- Superior in efficiency to Silicon Diode alternatives
- Reduced losses in associated MOSFET
- Reduced EMI
- Reduced cooling requirements
- RoHS compliant
- Insulated package rated at 2500V RMS

## 3. Applications

- Power factor correction
- Telecom / Server SMPS
- UPS
- PV inverter
- PC Silverbox
- LED / OLED TV
- Motor Drives

## 4. Quick reference data

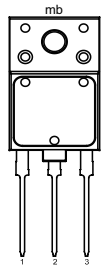
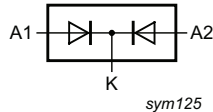
Table 1. Quick reference data

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Symbol	Parameter	Conditions	Values				Unit
Absolute maximum rating							
V <sub>RRM</sub>	repetitive peak reverse voltage		650				V
I <sub>O(AV)</sub>	average forward current	δ = 0.5 ; square-wave pulse; T <sub>h</sub> ≤ 51 °C; both diodes conducting; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	20				A
T <sub>j</sub>	junction temperature		175				°C
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 10 A; T <sub>j</sub> = 25 °C; per diode; <a href="#">Fig. 5</a>		-	1.5	1.7	V
		I <sub>F</sub> = 10 A; T <sub>j</sub> = 150 °C; per diode; <a href="#">Fig. 5</a>		-	1.8	2.2	V
Dynamic characteristics							
Q <sub>r</sub>	recovered charge	I <sub>F</sub> = 10 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>		-	14	-	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	n.c.	mounting base; isolated		

## 6. Ordering information

Table 3. Ordering information

Type number	Package name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
WNSC2D20650CJ	TO3PF	WNSC2D20650CJQ	Tube	30	SOT1293	16-Mar-2006

## 7. Marking

Table 4. Marking codes

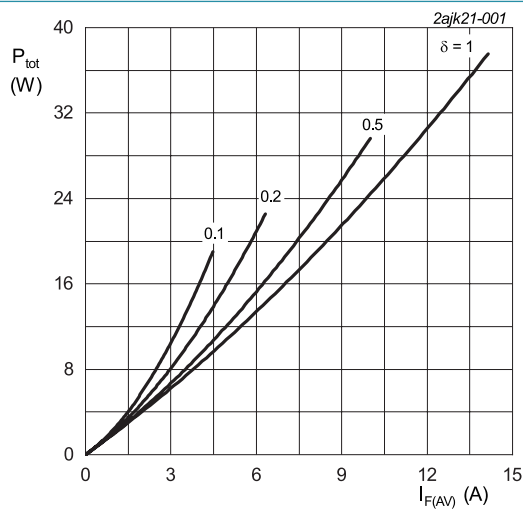
Type number	Marking codes
WNSC2D20650CJ	WNSC2D 20650CJ

## 8. Limiting values

**Table 5. Limiting values**

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

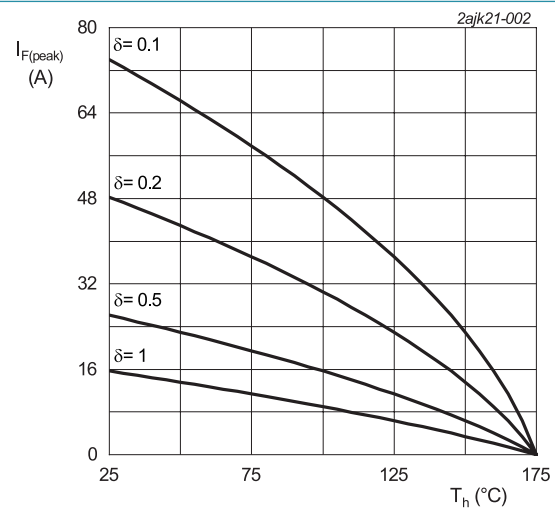
Symbol	Parameter	Conditions	Values	Unit
$V_{RRM}$	repetitive peak reverse voltage		650	V
$V_{RWM}$	crest working reverse voltage		650	V
$V_R$	reverse voltage	DC	650	V
$I_{O(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; $T_h \leq 51^\circ\text{C}$ ; both diodes conducting; Fig. 1; Fig. 2; Fig. 3	20	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\ \mu\text{s}$ ; $T_h \leq 89^\circ\text{C}$ ; square-wave pulse; per diode	20	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10\ \text{ms}$ ; $T_{j(\text{init})} = 25^\circ\text{C}$ ; sine-wave pulse; per diode	50	A
		$t_p = 10\ \mu\text{s}$ ; $T_{j(\text{init})} = 25^\circ\text{C}$ ; square-wave pulse; per diode	450	A
$I^2t$	$I^2t$ for fusing	sine-wave pulse; $T_{j(\text{init})} = 25^\circ\text{C}$ ; $t_p = 10\ \text{ms}$	12.5	$\text{A}^2\text{s}$
$T_{\text{stg}}$	storage temperature		-55 to 175	$^\circ\text{C}$
$T_j$	junction temperature		175	$^\circ\text{C}$



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

$$V_o = 1.916\ \text{V}; R_s = 0.0523\ \Omega$$

**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 heatsink temperature; per diode**

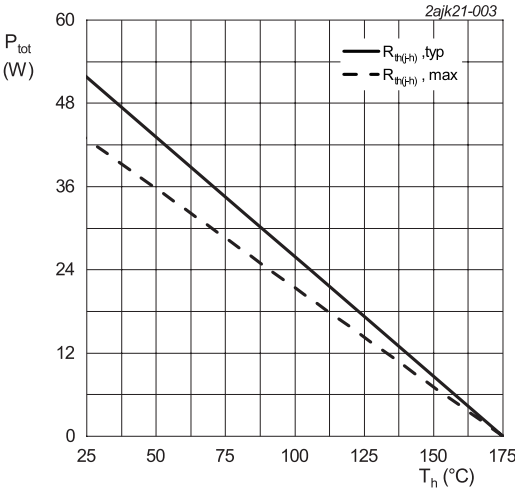


Fig. 3. Total power dissipation as a function of heatsink temperature; per diode

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	with heatsink compound; per diode; <a href="#">Fig. 4</a>		-	-	3.5	K/W
		with heatsink compound; both diodes conducting		-	-	2.7	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	35	-	K/W

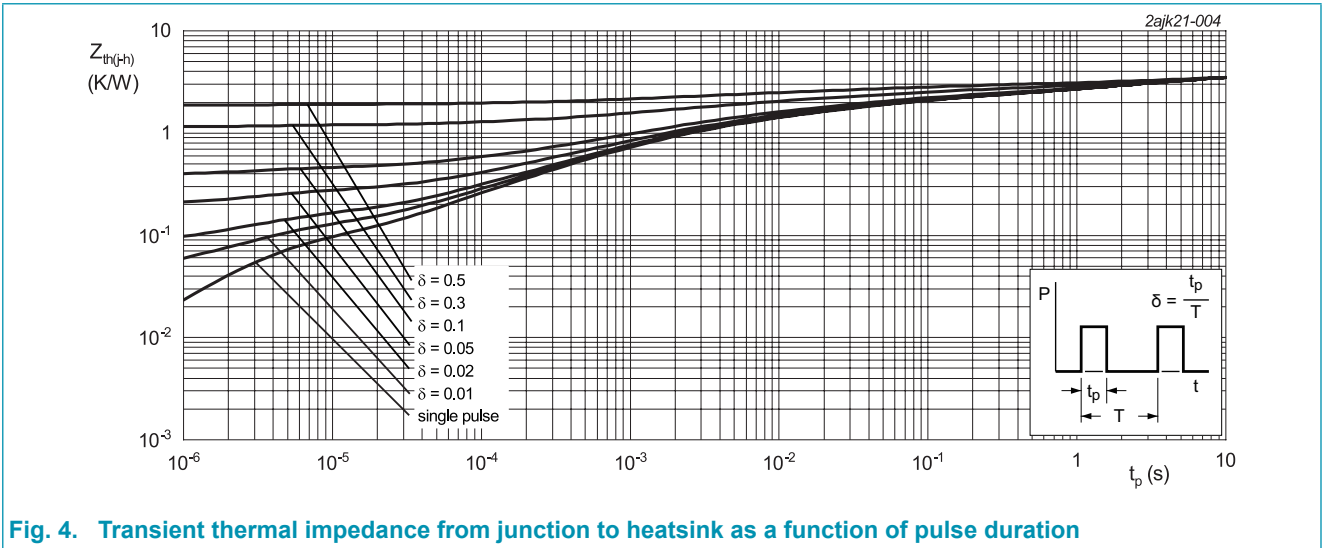


Fig. 4. Transient thermal impedance from junction to heatsink as a function of pulse duration

10. Isolation characteristics

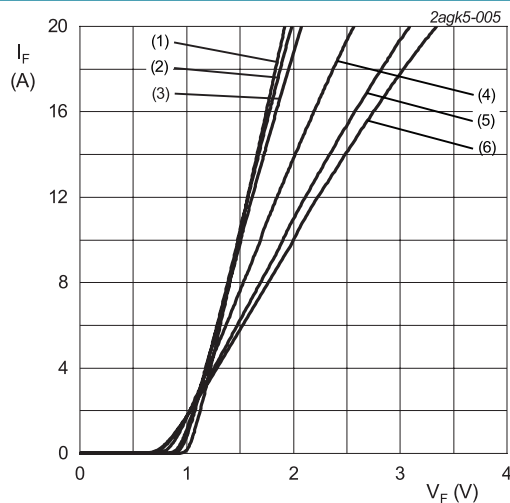
Table 7. Isolation characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	50 Hz ≤ f ≤ 60 Hz; RH ≤ 65 %; from all pins to external heatsink; sinusoidal waveform; clean and dust free		-	-	2500	V
$C_{isol}$	isolation capacitance	f = 1 MHz; from cathode to external heatsink		-	10	-	pF

## 11. Characteristics

Table 8. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V <sub>F</sub>	forward current	I <sub>F</sub> = 10 A; T <sub>J</sub> = 25 °C; per diode; <a href="#">Fig. 5</a>		-	1.5	1.7	V
		I <sub>F</sub> = 10 A; T <sub>J</sub> = 150 °C; per diode; <a href="#">Fig. 5</a>		-	1.8	2.2	V
		I <sub>F</sub> = 10 A; T <sub>J</sub> = 175 °C; per diode; <a href="#">Fig. 5</a>		-	2	2.3	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>		-	0.5	50	μA
		V <sub>R</sub> = 650 V; T <sub>J</sub> = 175 °C; per diode; <a href="#">Fig. 6</a>		-	25	250	μA
Dynamic characteristics							
Q <sub>r</sub>	recovered charge	I <sub>F</sub> = 10 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>		-	14	-	nC
C <sub>d</sub>	diode capacitance	f = 1 MHz; V <sub>R</sub> = 1 V; T <sub>J</sub> = 25 °C		-	310	-	pF
		f = 1 MHz; V <sub>R</sub> = 300 V; T <sub>J</sub> = 25 °C		-	36	-	pF
		f = 1 MHz; V <sub>R</sub> = 600 V; T <sub>J</sub> = 25 °C		-	32	-	pF
E <sub>as</sub>	non-repetitive avalanche energy	I <sub>R</sub> = 5.5 A; L = 5 mH; T <sub>J</sub> (init) = 25 °C; per diode		75	-	-	mJ



$V_o = 1.916\text{ V}$ ;  $R_s = 0.0523\text{ }\Omega$

- (1)  $T_J = -55\text{ }^\circ\text{C}$ ; typical values
- (2)  $T_J = 0\text{ }^\circ\text{C}$ ; typical values
- (3)  $T_J = 25\text{ }^\circ\text{C}$ ; typical values
- (4)  $T_J = 100\text{ }^\circ\text{C}$ ; typical values
- (5)  $T_J = 150\text{ }^\circ\text{C}$ ; typical values
- (6)  $T_J = 175\text{ }^\circ\text{C}$ ; typical values

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

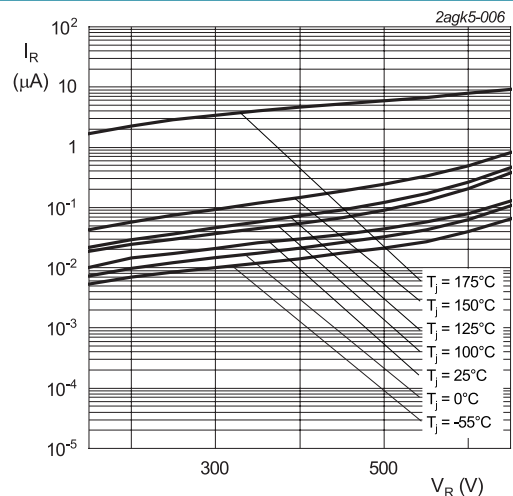


Fig. 6. Reverse leakage current as a function of reverse voltage; typical value; per diode

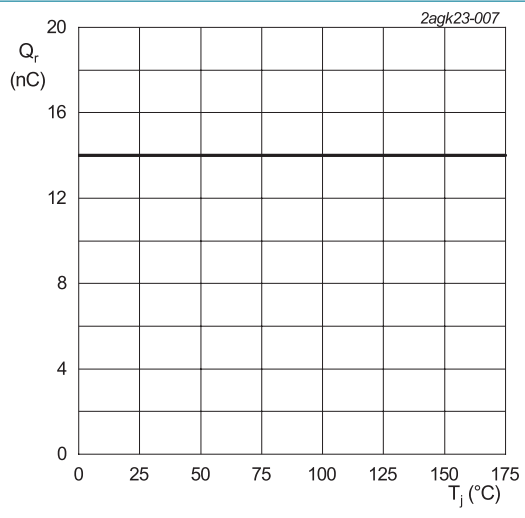
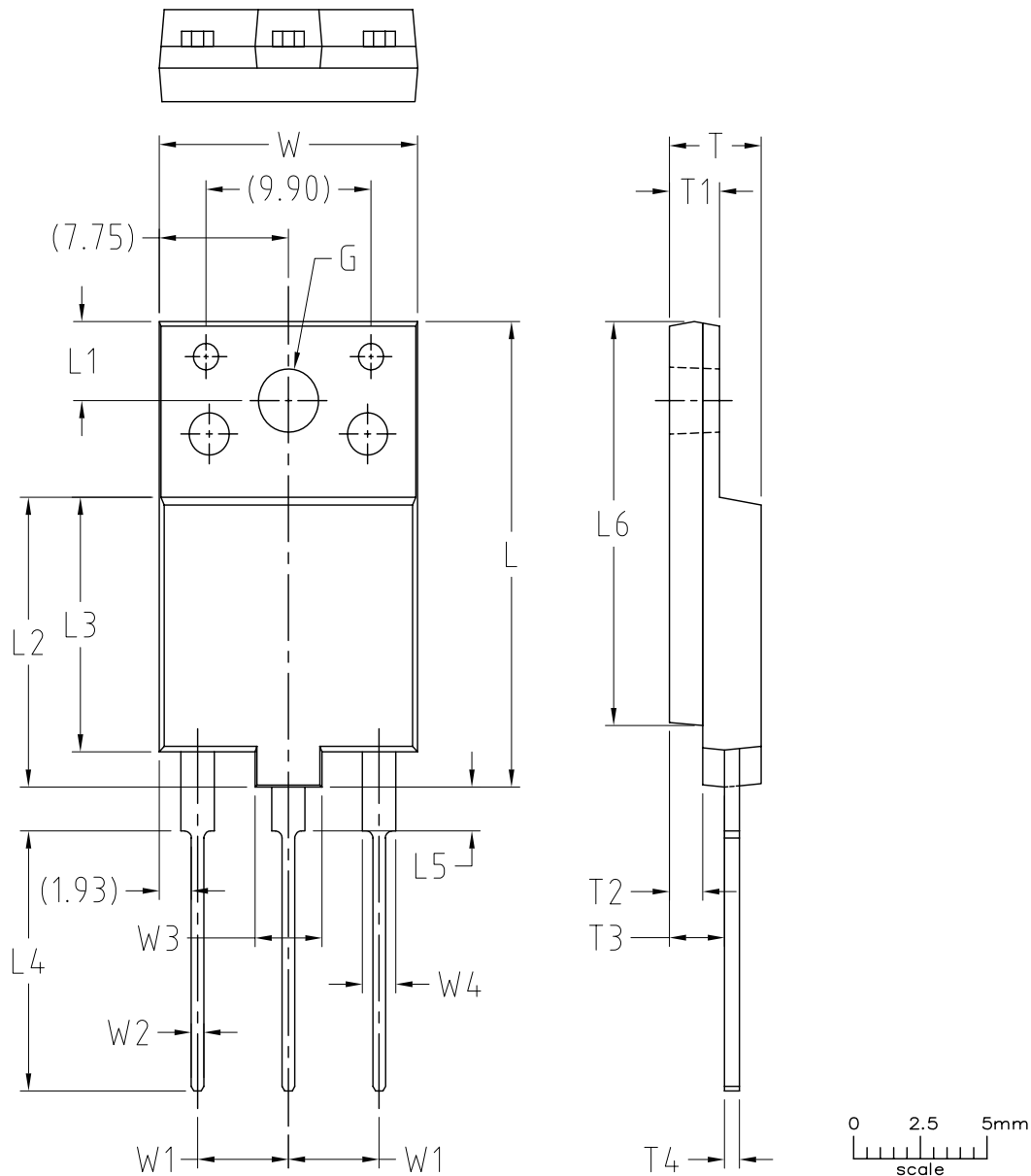


Fig. 7. Recovered charge as a function of junction temperature; per diode

12. Package outline

Plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-3P 'full pack' TO3PF



Remark : (X) the dimension X in blackets is for reference

UNIT	W	W1	W2	W3	W4	L	L1	L2	L3	L4	L5	L6	T	T1	T2	T3	T4	G(φ)
mm	15.7	5.75	0.95	4.20	2.20	26.7	4.6	16.7	14.7	15.0	2.7	23.2	5.7	3.2	2.2	3.5	1.1	3.8
	15.3	5.15	0.65	3.80	1.80	26.3	4.4	16.3	14.3	14.6	2.3	22.8	5.3	2.8	1.8	3.1	0.8	3.4

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
		TO-3PF				



## 13. 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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