

## 1. General description

Dual common cathode power Schottky diode designed for high frequency switched mode power supplies in a TO220F plastic package.



## 2. Features and benefits

- Trench structure
- High junction temperature up to 150°C
- Low forward voltage drop, negligible switching losses
- High efficiency

## 3. Applications

- DC to DC converters
- Freewheeling diode
- OR-ing diode
- Switched mode power supply rectifier

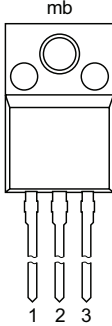
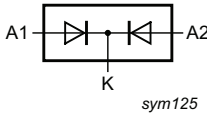
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
Absolute maximum rating							
V <sub>RRM</sub>	repetitive peak reverse voltage			120			V
I <sub>F(AV)</sub>	average forward current	δ = 0.5 ; square-wave pulse; per diode; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>		20			A
I <sub>O(AV)</sub>	average output current	δ = 0.5 ; square-wave pulse; both diodes conducting		40			A
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. 6</a>		-	0.95	1.05	V
I <sub>R</sub>	reverse current	V <sub>R</sub> = 120 V; T <sub>j</sub> = 25 °C; per diode; <a href="#">Fig. 7</a> ; <a href="#">Fig. 8</a>		-	4	20	μA

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode 1		
2	K	cathode		
3	A2	anode 2		
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
WN3S40120CX	TO220F	WN3S40120CXQ	Tube	50	SOT186A	14-Nov-2013

7. Marking

Table 4. Marking codes

Type number	Marking codes
WN3S40120CX	WN3S40 120CX

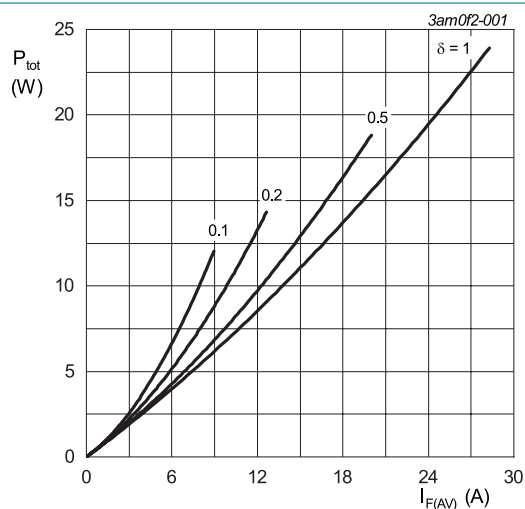
## 8. Limiting values

**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			120	V
$V_{RWM}$	crest working reverse voltage			120	V
$V_R$	reverse voltage	DC		120	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; per diode; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>		20	A
$I_{O(AV)}$	average output current	$\delta = 0.5$ ; square-wave pulse; both diodes conducting		40	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(\text{init})} = 25$ °C; sine-wave pulse; per diode; <a href="#">Fig. 4</a>		330	A
		$t_p = 8.3$ ms; $T_{j(\text{init})} = 25$ °C; sine-wave pulse; per diode		363	A
$T_{stg}$	storage temperature			-40 to 150	°C
$T_j$	junction temperature		[1]	-40 to 150	°C

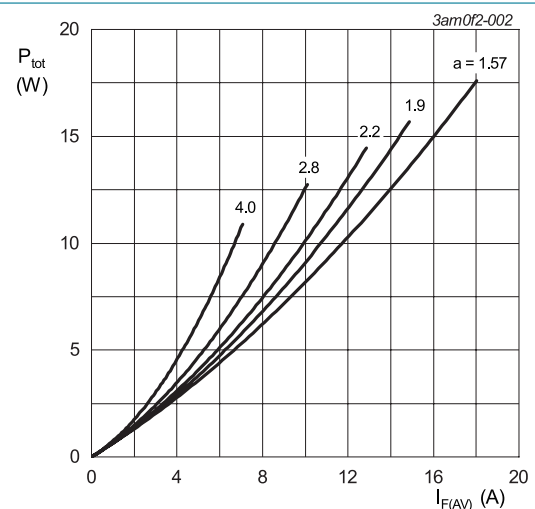
[1] The heat generated must be less than the thermal conductivity from Junction to Ambient:  $dP_{tot}/dT_j < 1/R_{th(j-a)}$



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

$$V_o = 0.614 \text{ V}; R_s = 0.0082 \text{ } \Omega$$

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



$$a = \text{form factor} = I_{F(RMS)} / I_{F(AV)}$$

$$V_o = 0.614 \text{ V}; R_s = 0.0082 \text{ } \Omega$$

**Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values; per diode**

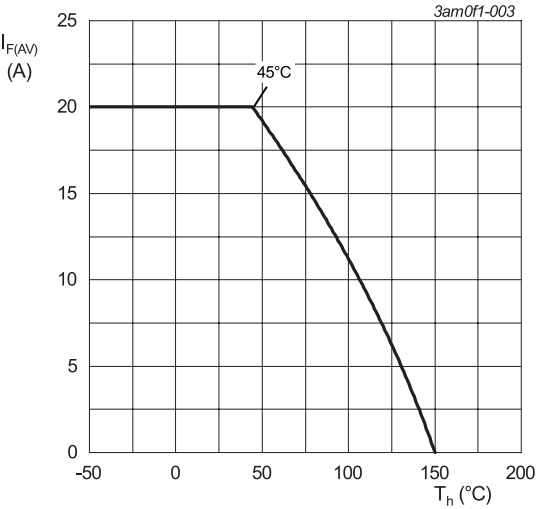


Fig. 3. Average forward current as a function of heatsink temperature; maximum values; per diode

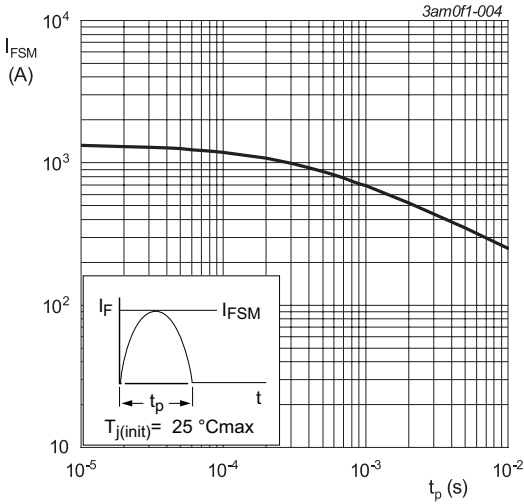


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values; per diode

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	with heatsink compound; per diode; <a href="#">Fig. 5</a>		-	-	5.6	K/W
		with heatsink compound; both diodes conducting		-	-	4.3	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	60	-	K/W

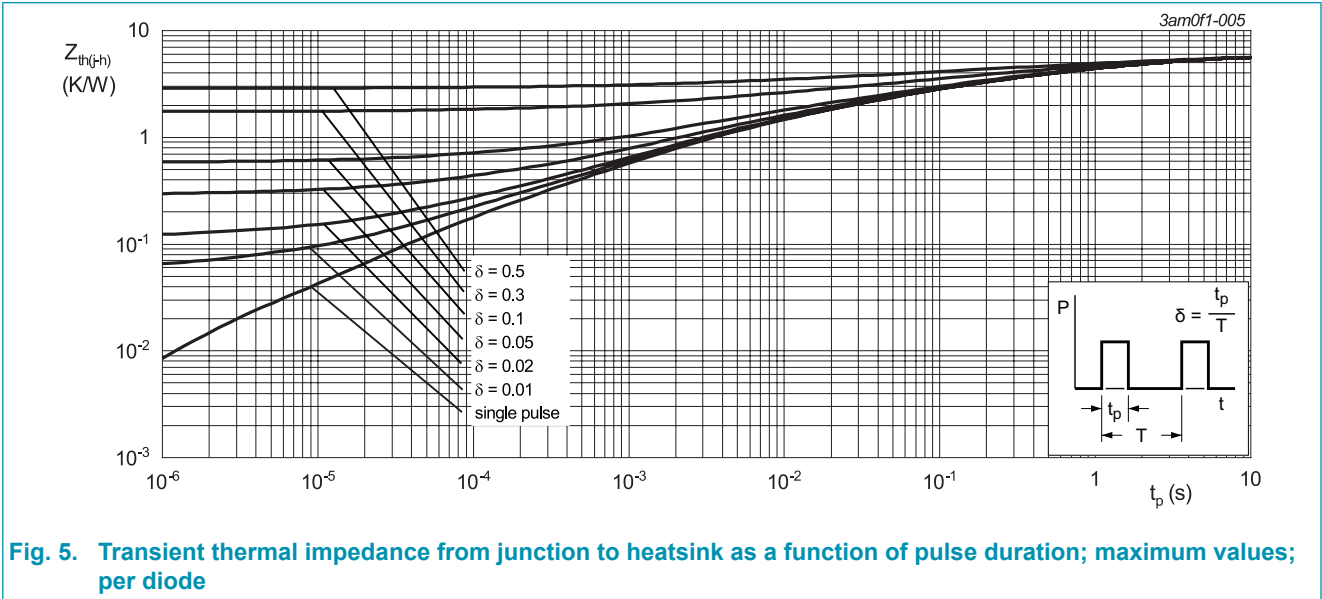


Fig. 5. Transient thermal impedance from junction to heatsink as a function of pulse duration; maximum values; per diode

10. Isolation characteristics

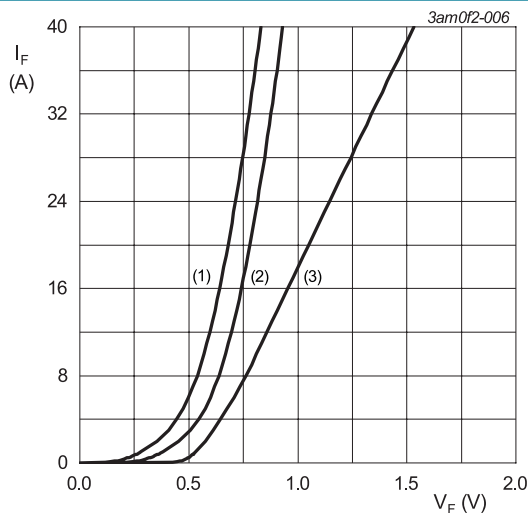
Table 7. Isolation characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	from all terminals to external heatsink; sinusoidal waveform; clean and dust free; 50 Hz $\leq f \leq$ 60 Hz; $T_h = 25\text{ }^{\circ}\text{C}$ ; RH $\leq 65\%$		-	-	2500	V

## 11. Characteristics

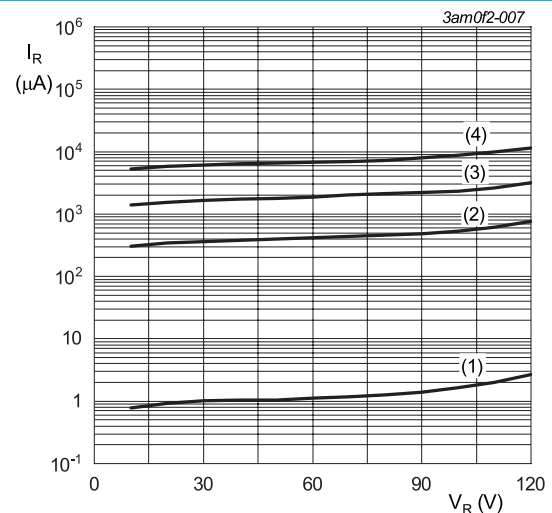
Table 8. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
<b>Static characteristics</b>							
$V_F$	forward voltage	$I_F = 20\text{ A}$ ; $T_J = 25\text{ °C}$ ; per diode; <a href="#">Fig. 6</a>		-	0.95	1.05	V
		$I_F = 20\text{ A}$ ; $T_J = 125\text{ °C}$ ; per diode; <a href="#">Fig. 6</a>		-	0.72	-	V
		$I_F = 15\text{ A}$ ; $T_J = 25\text{ °C}$ ; per diode; <a href="#">Fig. 6</a>		-	0.82	-	V
		$I_F = 15\text{ A}$ ; $T_J = 125\text{ °C}$ ; per diode; <a href="#">Fig. 6</a>		-	0.66	-	V
		$I_F = 2\text{ A}$ ; $T_J = 25\text{ °C}$ ; per diode; <a href="#">Fig. 6</a>		-	0.47	-	V
		$I_F = 2\text{ A}$ ; $T_J = 125\text{ °C}$ ; per diode; <a href="#">Fig. 6</a>		-	0.39	-	V
$I_R$	reverse current	$V_R = 120\text{ V}$ ; $T_J = 25\text{ °C}$ ; per diode; <a href="#">Fig. 7</a> ; <a href="#">Fig. 8</a>		-	4	20	$\mu\text{A}$
		$V_R = 120\text{ V}$ ; $T_J = 125\text{ °C}$ ; per diode; <a href="#">Fig. 7</a> ; <a href="#">Fig. 8</a>		-	3	20	mA



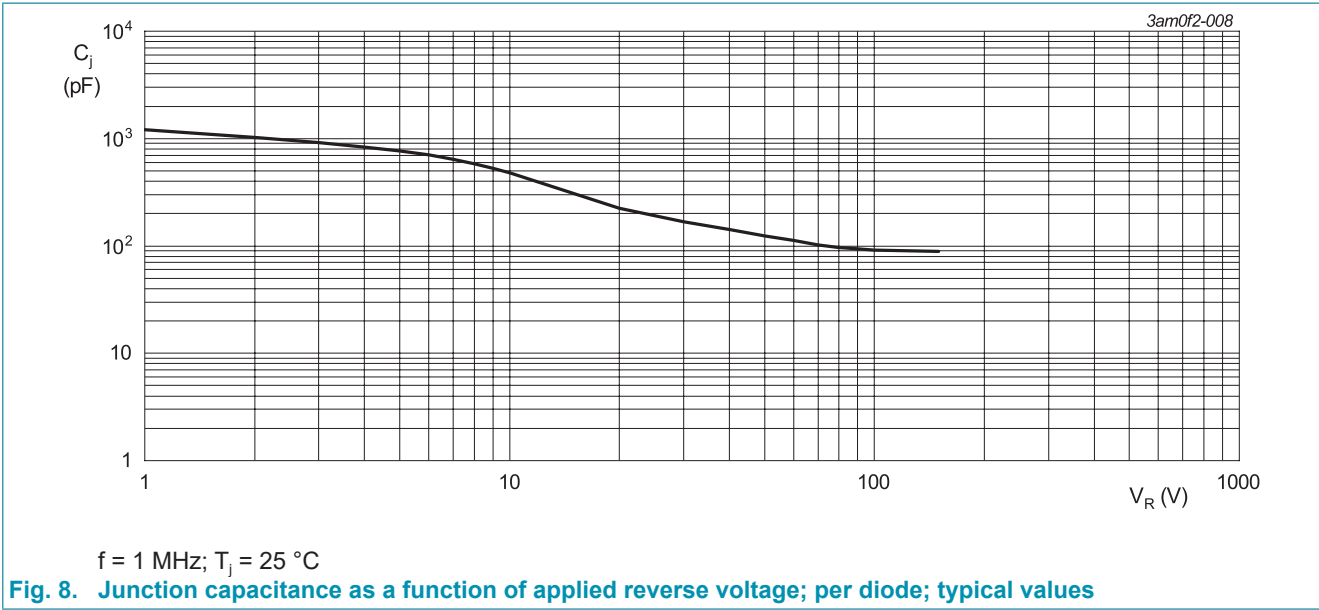
$V_o = 0.614\text{ V}$ ;  $R_s = 0.0082\ \Omega$   
 (1)  $T_J = 150\text{ °C}$ ; typical values  
 (2)  $T_J = 150\text{ °C}$ ; maximum values  
 (3)  $T_J = 25\text{ °C}$ ; maximum values

**Fig. 6. Forward current as a function of forward voltage; per diode**



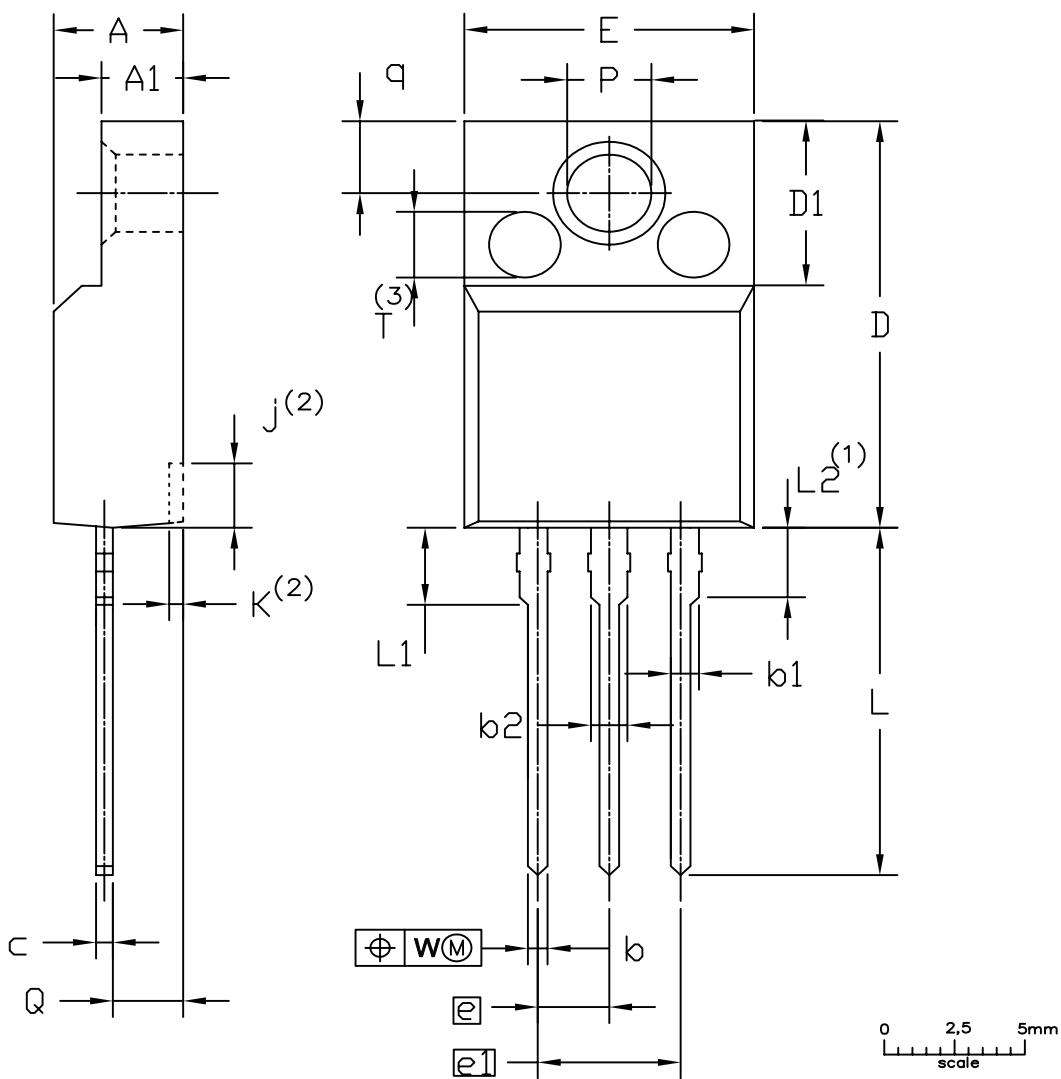
(1)  $T_J = 25\text{ °C}$ ; typical values  
 (2)  $T_J = 100\text{ °C}$ ; typical values  
 (3)  $T_J = 125\text{ °C}$ ; typical values  
 (4)  $T_J = 150\text{ °C}$ ; typical values

**Fig. 7. Reverse leakage current as a function of reverse voltage; per diode; typical values**




12. Package outline

Plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-220 "full pack" SOT186A



UNIT	A	A <sub>1</sub>	b	b <sub>1</sub>	b <sub>2</sub>	c	D	D <sub>1</sub>	E	e	e <sub>1</sub>	j <sup>(2)</sup>	k <sup>(2)</sup>	L	L <sub>1</sub>	L <sub>2</sub> <sup>(1)</sup> max.	P	Q	q	W	T <sup>(3)</sup>
mm	4.6	2.9	0.9	1.1	1.4	0.7	15.8	6.5	10.3	2.54	5.08	2.7	0.6	14.4	3.30	3	3.2	2.6	3.0	0.4	2.5
	4.0	2.5	0.7	0.9	1.0	0.4	15.2	6.3	9.7			1.7	0.4	13.5	2.79		3.0	2.3	2.6		

- Notes
1. Terminal dimensions within this zone are uncontrolled
  2. Dot lines area designs may vary
  3. Eject pin mark is for reference only

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT186A		3 LEADS TO220F				2013-11-14



## 13. 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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## 14. Contents

1. General description.....	1
2. Features and benefits .....	1
3. Applications .....	1
4. Quick reference data.....	1
5. Pinning information.....	2
6. Ordering information.....	2
7. Marking.....	2
8. Limiting values .....	3
9. Thermal characteristics .....	5
10. Isolation characteristics .....	5
11. Characteristics.....	6
12. Package outline .....	8
13. Legal information .....	9
14. Contents .....	11

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