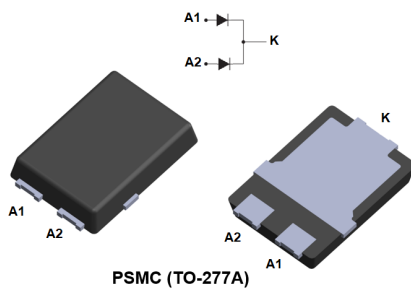


## 200 V, dual 5 A ultrafast rectifier



### Features

- 175 °C maximum operation junction temperature
- High surge current capability
- ECOPACK2 compliant component

### Application

- DC/DC converters
- Freewheeling diodes
- LED Lighting

### Description

The STTH1002CSF has been developed for applications requiring an optimized VF and reverse recovery characteristics.

These characteristics make it ideal for use in secondary rectification functions, such as DC/DC converters or lighting applications.

#### Product status link

[STTH1002CSF](#)

#### Product summary

Symbol	Value
$I_{F(AV)}$	2 X 5 A
$V_{RRM}$	200 V
$t_{rr(max)}$	27 ns
$T_j(max.)$	175 °C
$V_F(typ.)$	0.79 V

# 1 Characteristics

**Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified, per diode)**

Symbol	Parameter		Value	Unit	
$V_{RRM}$	Repetitive peak reverse voltage		200	V	
$I_{F(AV)}$	Average forward current, $\delta = 0.5$	Per diode	$T_c = 160\text{ °C}$	5	A
		Per device	$T_c = 160\text{ °C}$	10	
$I_{FSM}$	Surge non repetitive forward current		$t_p = 10\text{ ms}$ sinusoidal	85	A
$T_{stg}$	Storage temperature range		-65 to +175	°C	
$T_j$	Maximum operating junction temperature range		+175	°C	

**Table 2. Thermal resistance parameters**

Symbol	Parameter		Typ.	Unit
$R_{th(j-c)}$	Junction to case	Per diode	2.45	°C/W
		Per device	1.66	
$R_{th(c)}$	Coupling		0.87	°C/W

For more information, please refer to the following application note:

- AN5088: Rectifiers thermal management, handling and mounting recommendations

When the diodes 1 and 2 are used simultaneously:

$$\Delta T_j(\text{diode1}) = P_{(\text{diode1})} \times R_{th(j-c)} (\text{per diode}) + P_{(\text{diode2})} \times R_{th(c)}$$

**Table 3. Static electrical characteristics (per diode)**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-		4	$\mu\text{A}$
		$T_j = 125\text{ °C}$		-	4	40	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 5\text{ A}$	-	0.91	1.05	V
		$T_j = 125\text{ °C}$		-	0.79	0.91	
		$T_j = 25\text{ °C}$	$I_F = 10\text{ A}$	-	1.02	1.17	
		$T_j = 125\text{ °C}$		-	0.90	1.04	

1. Pulse test:  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

2. Pulse test:  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

$$P = 0.78 \times I_{F(AV)} + 0.026 \times I_F^2(\text{RMS})$$

For more information, please refer to the following application notes related to the power losses:

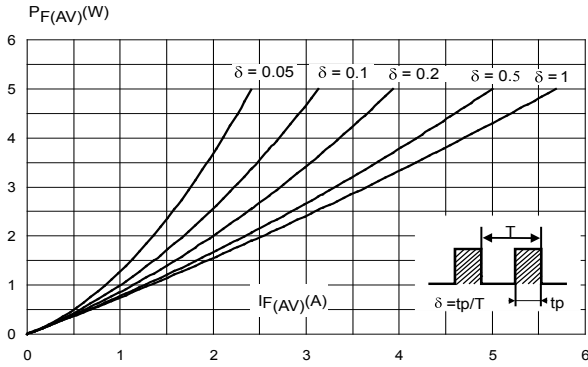
- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses in a power diode

**Table 4. Dynamic characteristics per diode at  $T_j = 25^\circ\text{C}$ , unless otherwise specified**

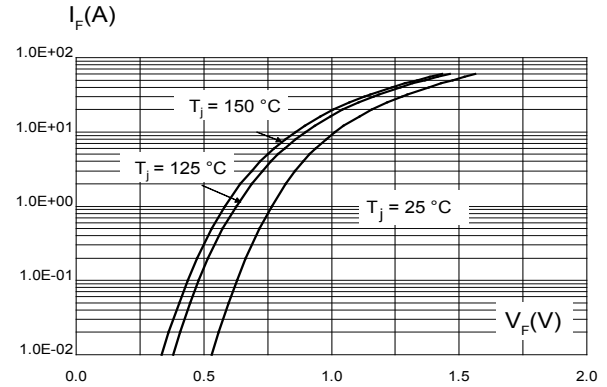
Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25^\circ\text{C}$	$I_F = 1\text{ A}, dI_F/dt = -50\text{ A}/\mu\text{s}, V_R = 30\text{ V}$	-	28	35	ns
			$I_F = 1\text{ A}, dI_F/dt = -100\text{ A}/\mu\text{s}, V_R = 30\text{ V}$	-	21	27	
$I_{RM}$	Reverse recovery current	$T_j = 125^\circ\text{C}$	$I_F = 5\text{ A}, dI_F/dt = -200\text{ A}/\mu\text{s}, V_R = 160\text{ V}$	-	6.3		A

### 1.1 Characteristics (curves)

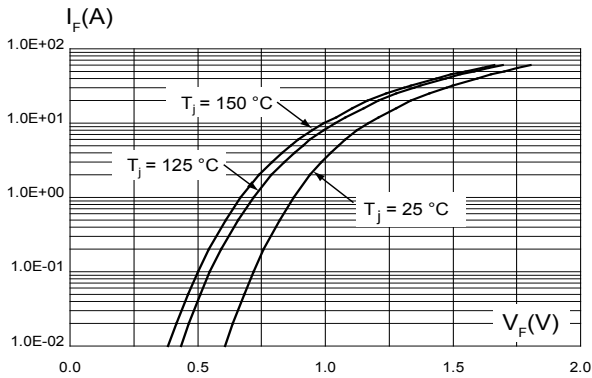
**Figure 1. Conduction losses versus average forward current (per diode)**



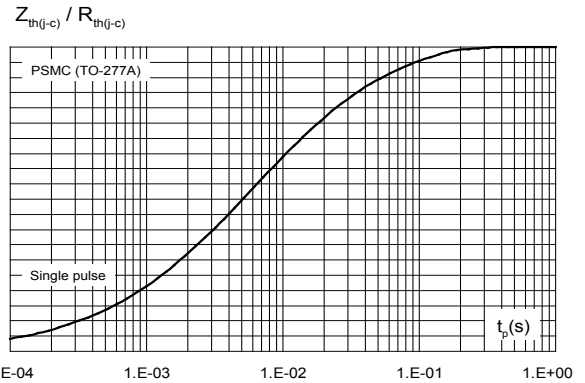
**Figure 2. Forward voltage drop versus forward current (typical values, per diode)**



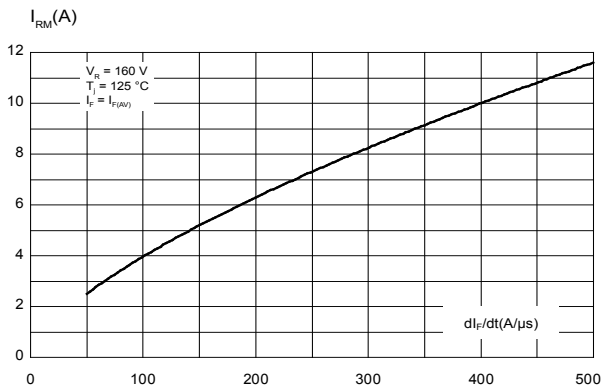
**Figure 3. Forward voltage drop versus forward current (maximum values, per diode)**



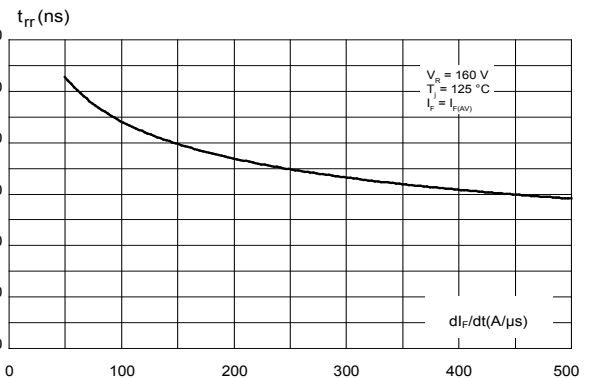
**Figure 4. Relative variation of thermal impedance junction to case total versus pulse duration**



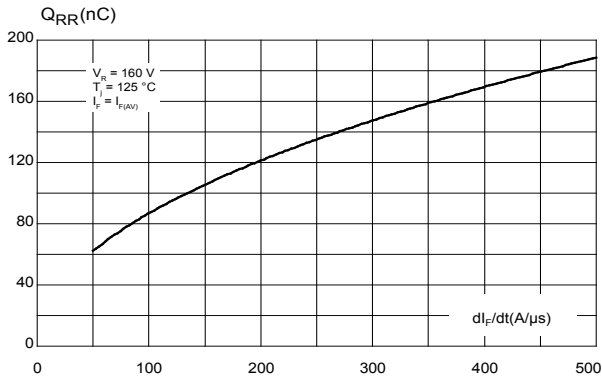
**Figure 5. Peak reverse recovery current versus  $dI_F/dt$  (typical values, per diode)**



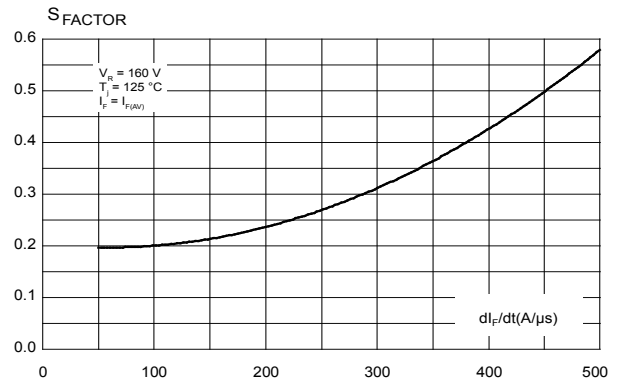
**Figure 6. Reverse recovery time versus  $dI_F/dt$  (typical values, per diode)**



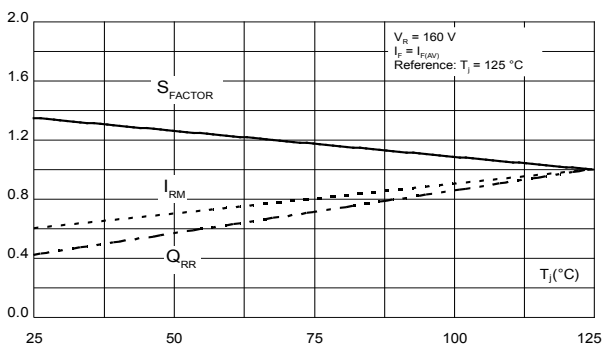
**Figure 7. Reverse recovery charges versus  $di_F/dt$  (typical values, per diode)**



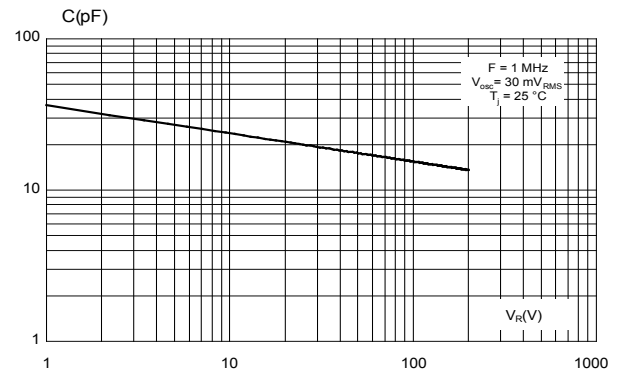
**Figure 8. Reverse recovery softness versus  $di_F/dt$  (typical values, per diode)**



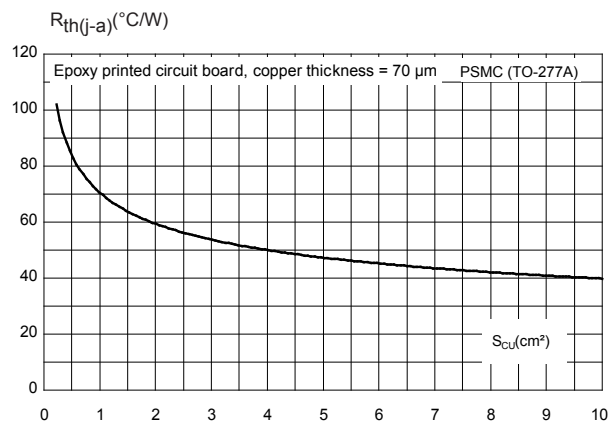
**Figure 9. Relative variations of dynamic parameters versus junction temperature**



**Figure 10. Junction capacitance versus reverse voltage applied (typical values, per diode)**



**Figure 11. Thermal resistance junction to ambient versus copper surface under tab (typical values, epoxy printed board FR4,  $e_{Cu} = 70 \mu\text{m}$ ) (PSMC (TO-277A))**



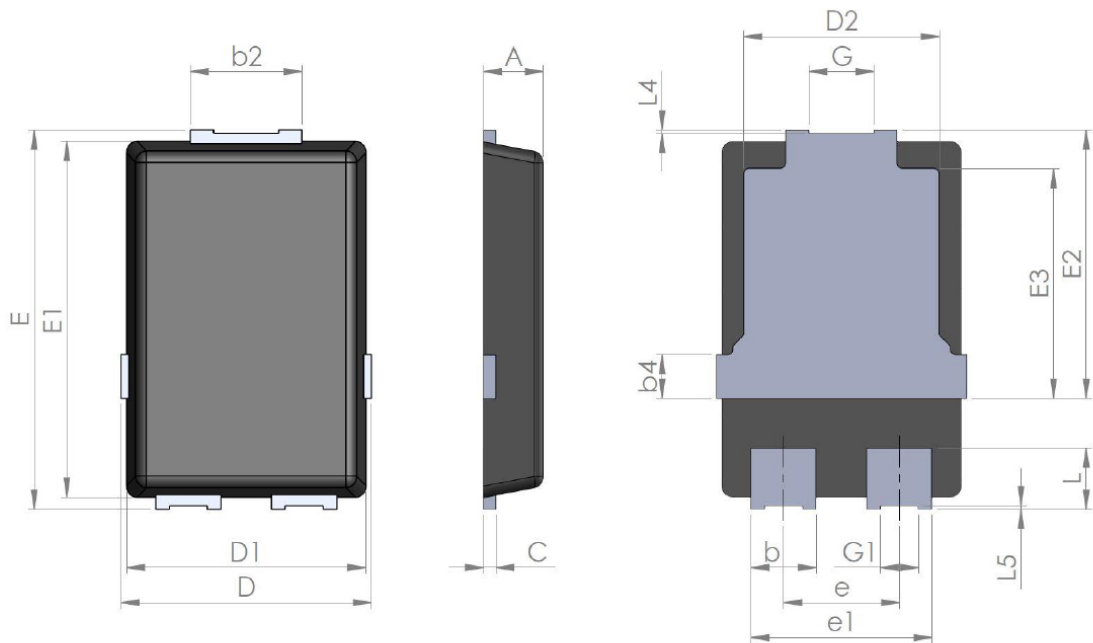
## 2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of **ECOPACK** packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK is an ST trademark.

### 2.1 PSMC (TO-277A) package information

- Epoxy meets UL94,V0
- Cooling method : by conduction (C)

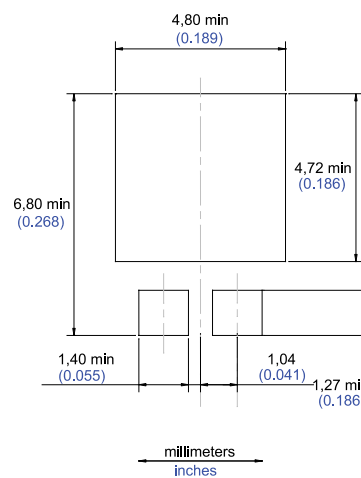
Figure 12. PSMC (TO-277A) package outline



**Table 5. PSMC (TO-277A) package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches (for reference only)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	1.00	1.10	1.20	0.039	0.043	0.047
b	1.05	1.20	1.35	0.041	0.047	0.053
b2	1.90	2.05	2.20	0.075	0.081	0.087
b4		0.75			0.029	
C	0.15	0.23	0.40	0.006	0.009	0.016
D	4.45	4.60	4.75	0.175	0.181	0.187
D1	4.25	4.40	4.45	0.167	0.173	0.175
D2	3.40	3.60	3.70	0.134	0.142	0.146
E	6.35	6.50	6.65	0.250	0.256	0.262
E1	6.05	6.10	6.15	0.238	0.240	0.242
E2	4.50	4.60	4.70	0.177	0.181	0.185
E3		3.94			1.55	
e		2.13			0.084	
e1		3.33			0.131	
G		1.20			0.047	
G1		0.70			0.027	
L	0.90	1.05	1.24	0.035	0.041	0.049
L4	0.02			0.0008		
L5	0.02			0.0008		

**Figure 13. PSMC (TO-277A) package footprint in mm (in inches)**



**Note:** For package and tape orientation, reel and inner box dimensions and tape outline please check [TN1173](#)

### 3 Ordering information

**Table 6. Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH1002CSF	TH1002C	PSMC (TO-277A)	90 mg	6000	Tape and Reel



## Revision history

**Table 7. Document revision history**

Date	Version	Changes
29-Oct-2020	1	Initial release.

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