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Low drop power Schottky rectifier

Main product characteristics

$I_{F(AV)}$	2 A
V_{RRM}	25 V
T_j (max)	150° C
V_F (max)	0.375 V

Features and benefits

- Very low forward voltage drop for less power dissipation
- Optimized conduction/reverse losses trade-off which means the highest efficiency in the applications
- Avalanche capability specified

Description

Single Schottky rectifier suited to switched mode power supplies and high frequency DC to DC converters.

Packaged in SMB, SMB flat for thermal resistance characteristic improvement, this device is especially intended for use in parallel with MOSFETs in synchronous rectification.

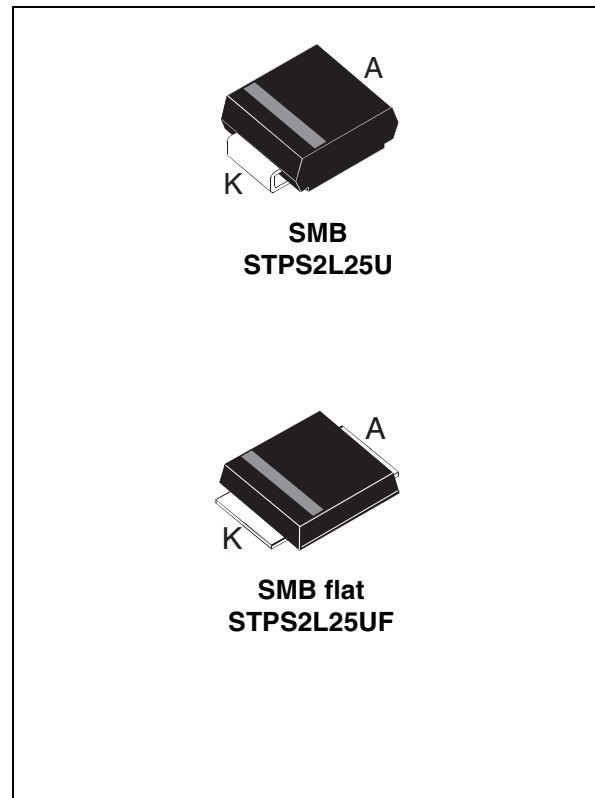


Table 1. Absolute ratings (limiting values)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			25	V
$I_{F(AV)}$	Average forward current	SMB	$T_L = 125^\circ\text{C} \quad \delta = 0.5$	2	A
		SMB flat	$T_L = 135^\circ\text{C} \quad \delta = 0.5$		
I_{FSM}	Surge non repetitive forward current		$t_p = 10 \text{ ms sinusoidal}$	75	A
P_{ARM}	Repetitive peak avalanche power		$t_p = 1 \mu\text{s} \quad T_j = 25^\circ\text{C}$	1500	W
T_{stg}	Storage temperature range			-65 to + 150	°C
T_j	Operating junction temperature ⁽¹⁾			150	°C

1. $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$ condition to avoid thermal runaway for a diode on its own heatsink

1 Characteristics

Table 2. Thermal resistance

Symbol	Parameter		Value	Unit
$R_{th(j-l)}$	Junction to lead	SMB	25	°C/W
		SMB flat	15	

Table 3. Static electrical characteristics

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_J = 25^\circ\text{C}$	$V_R = V_{RRM}$			90	μA
		$T_J = 125^\circ\text{C}$			15	30	mA
$V_F^{(1)}$	Forward voltage drop	$T_J = 25^\circ\text{C}$	$I_F = 2\text{ A}$			0.45	V
		$T_J = 125^\circ\text{C}$			0.325	0.375	
		$T_J = 25^\circ\text{C}$	$I_F = 4\text{ A}$			0.53	
		$T_J = 125^\circ\text{C}$			0.43	0.51	

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

To evaluate the maximum conduction losses, use the following equation:

$$P = 0.24 \times I_{F(AV)} + 0.068 I_{F(RMS)}^2$$

Figure 1. Average forward power dissipation versus average forward current

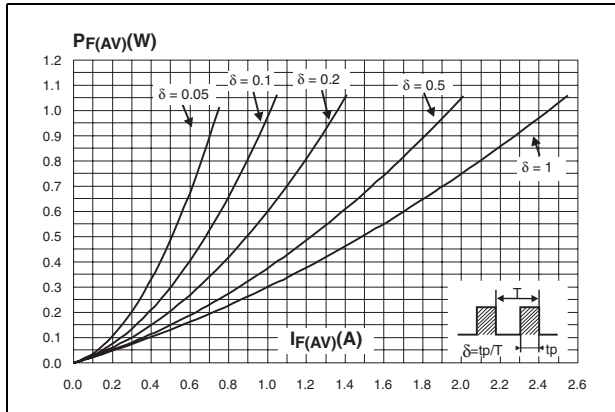


Figure 2. Average forward current versus ambient temperature (delta = 0.5) SMB

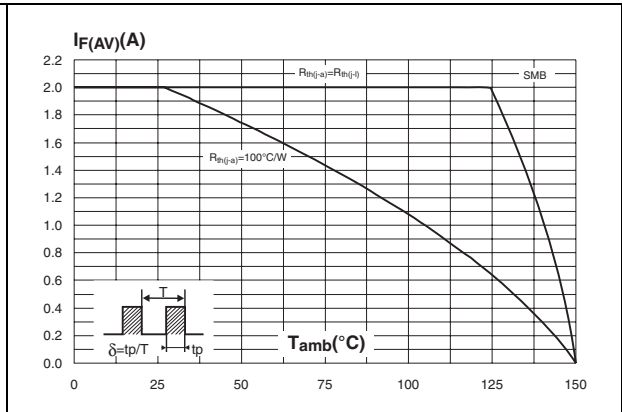


Figure 3. Average forward current versus ambient temperature (delta = 0.5) SMB flat

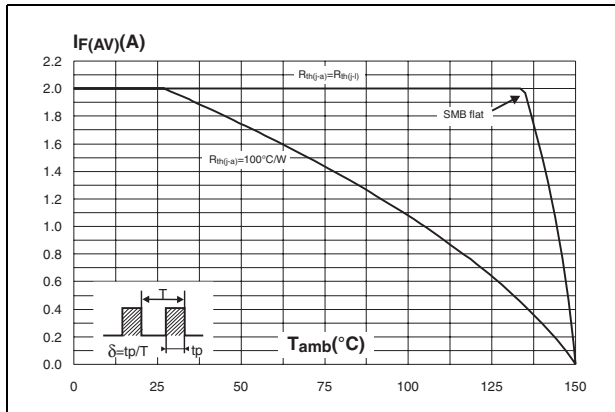


Figure 4. Non repetitive surge peak forward current versus overload duration (maximum values) SMB

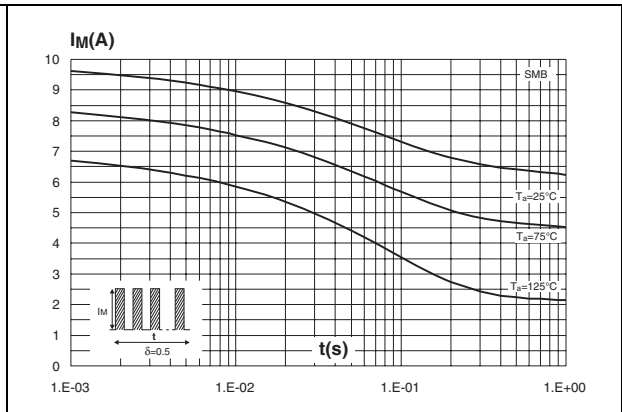


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values) SMB flat

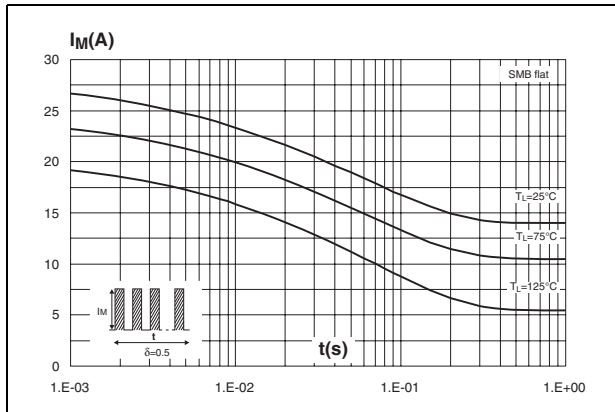


Figure 6. Normalized avalanche power derating versus pulse duration

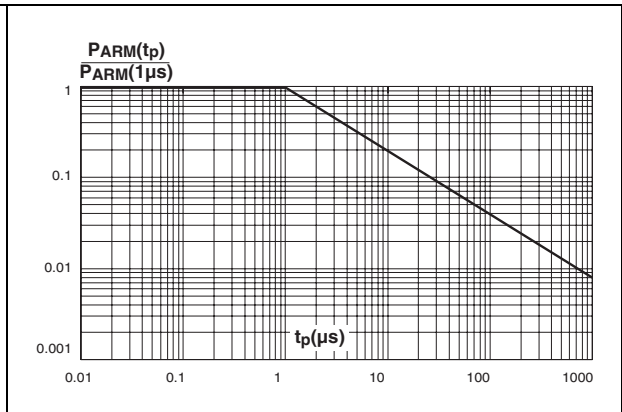


Figure 7. Normalized avalanche power derating versus junction temperature

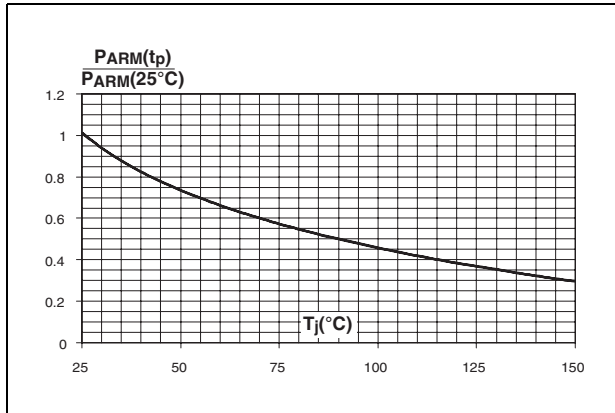


Figure 8. Relative variation of thermal impedance junction to ambient versus pulse duration - SMB

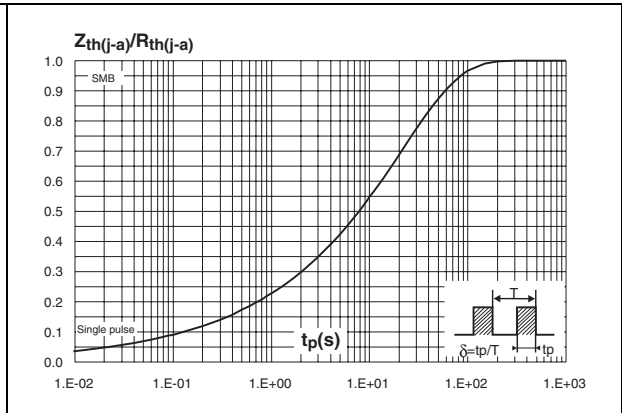


Figure 9. Relative variation of thermal impedance junction to lead versus pulse duration - SMB flat

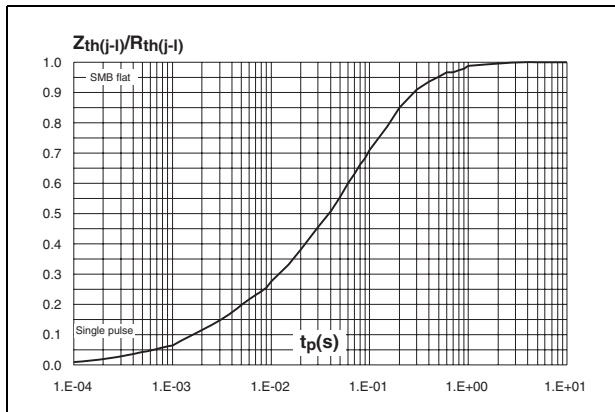


Figure 10. Reverse leakage current versus reverse voltage applied (typical values)

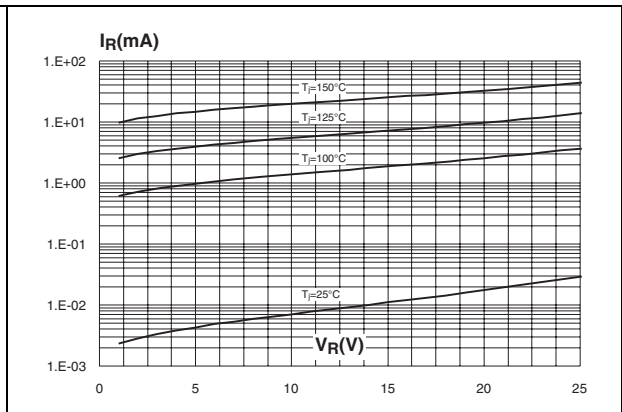


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

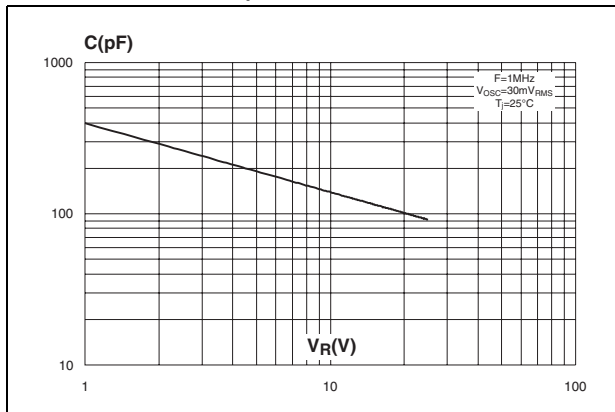


Figure 12. Forward voltage drop versus forward current (typical values)

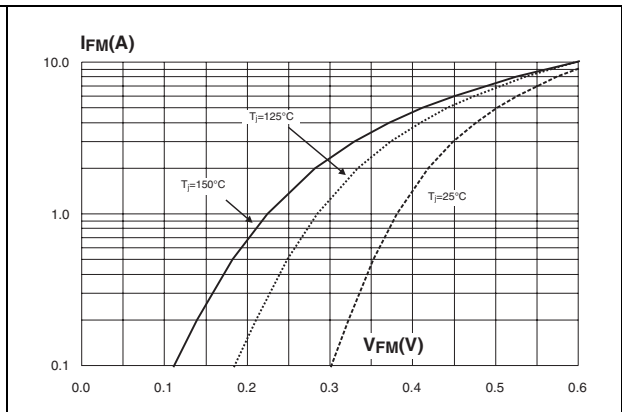


Figure 13. Forward voltage drop versus forward current (maximum values, high level)

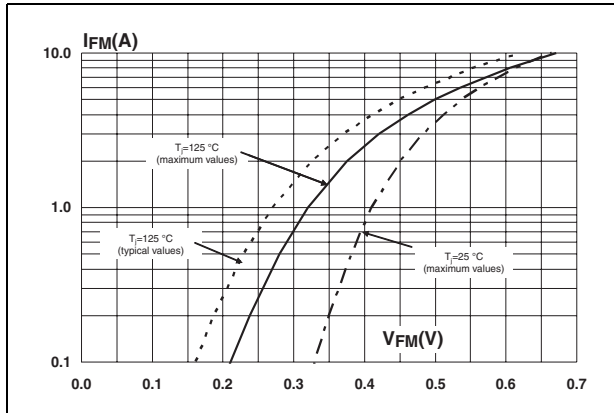


Figure 14. Forward voltage drop versus forward current (maximum values, low level)

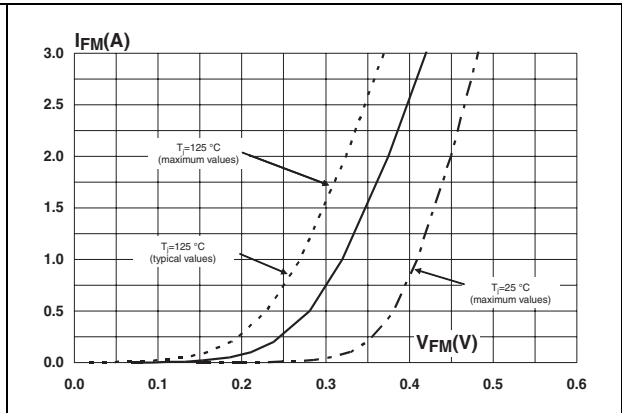
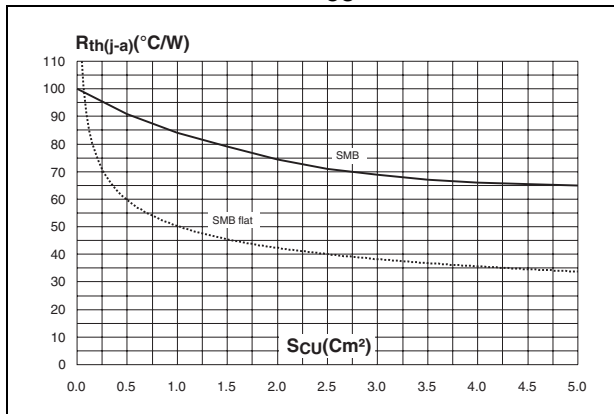


Figure 15. Thermal resistance junction to ambient versus copper surface under each lead (epoxy printed board FR4, e_{CU}=35µm)



2 Package information

- Epoxy meets UL94, V0

Table 4. SMB dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.096
A2	0.05	0.20	0.002	0.008
b	1.95	2.20	0.077	0.087
c	0.15	0.40	0.006	0.016
E	5.10	5.60	0.201	0.220
E1	4.05	4.60	0.159	0.181
D	3.30	3.95	0.130	0.156
L	0.75	1.50	0.030	0.059

Figure 16. SMB footprint (dimensions in mm)

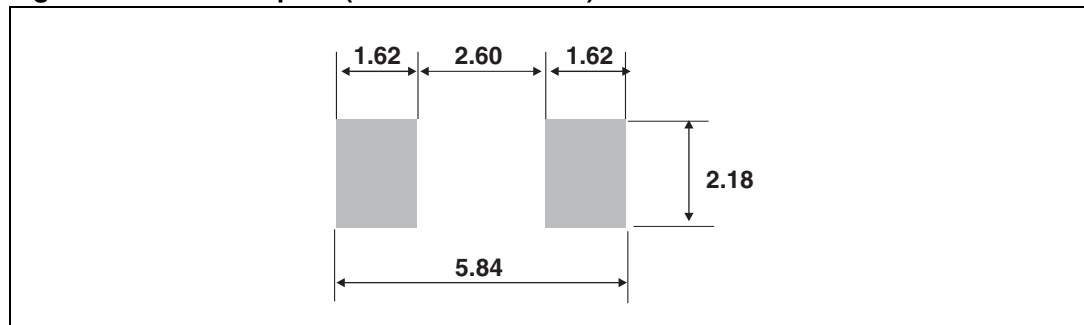
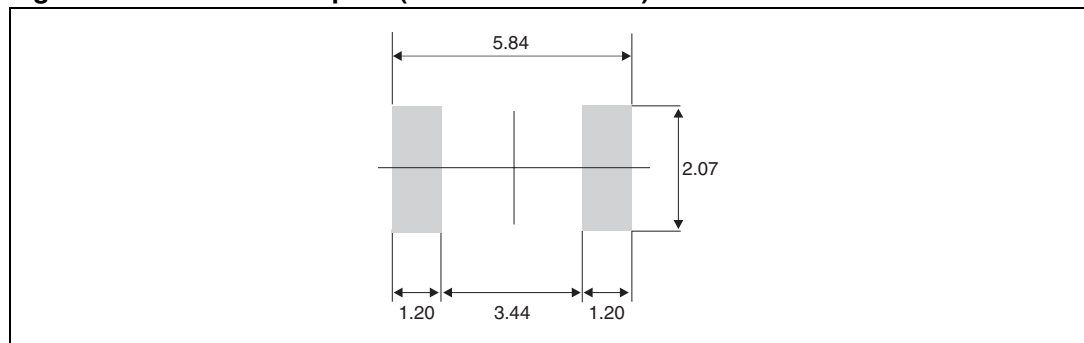


Table 5. SMB Flat dimensions

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.90		1.10	0.035		0.043
b ⁽¹⁾	1.95		2.20	0.077		0.087
c ⁽¹⁾	0.15		0.40	0.006		0.016
D	3.30		3.95	0.130		0.156
E	5.10		5.60	0.200		0.220
E1	4.05		4.60	0.189		0.181
L	0.75		1.50	0.029		0.059
L1		0.40			0.016	
L2		0.60			0.024	

1. Applies to plated leads

Figure 17. SMB Flat footprint (dimensions in mm)



In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

3 Ordering information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STPS2L25U	G23	SMB	0.107 g	2500	Tape and reel
STPS2L25UF	FG23	SMB flat	0.50 g	5000	Tape and reel

4 Revision history

Date	Revision	Changes
July 2003	4A	Last update
08-Feb-2007	5	Reformatted to current standard. Added ECOPACK statement. Added SMB flat package.

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