

## POWER SCHOTTKY RECTIFIER

**Table 1: Main Product Characteristics**

$I_{F(AV)}$	1 A
$V_{RRM}$	40 V
$T_j(\text{max})$	150°C
$V_F(\text{max})$	0.5 V

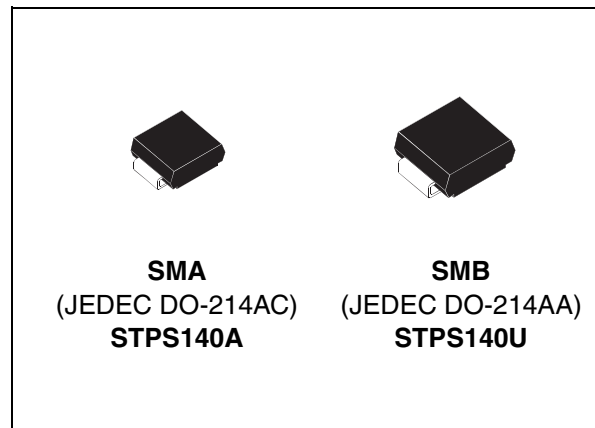
### FEATURES AND BENEFITS

- Very small conduction losses
- Negligible switching losses
- Low forward voltage drop
- Surface mount miniature packages
- Avalanche capability specified

### DESCRIPTION

Single chip Schottky rectifiers suited to Switched Mode Power Supplies and high frequency DC to DC converters.

Packaged in SMA and SMB, this device is especially intended for surface mounting and used in low voltage, high frequency inverters, free wheeling and polarity protection applications.



**Table 2: Order Codes**

Part Number	Marking
STPS140A	S140
STPS140U	G14

**Table 3: Absolute Ratings** (limiting values)

Symbol	Parameter	Value	Unit	
$V_{RRM}$	Repetitive peak reverse voltage	40	V	
$I_{F(RMS)}$	RMS forward voltage	7	A	
$I_{F(AV)}$	Average forward current	SMA $T_L = 130^\circ\text{C} \quad \delta = 0.5$	1	A
		SMB $T_L = 135^\circ\text{C} \quad \delta = 0.5$		
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10\text{ms}$ sinusoidal	60	A
$I_{RRM}$	Repetitive peak reverse current	$t_p = 2\mu\text{s} \quad F = 1\text{kHz}$ square	1	A
$I_{RSM}$	Non repetitive peak reverse current	$t_p = 100\mu\text{s}$ square	1	A
$P_{ARM}$	Repetitive peak avalanche power	$t_p = 1\mu\text{s} \quad T_j = 25^\circ\text{C}$	900	W
$T_{stg}$	Storage temperature range	-65 to + 150		°C
$T_j$	Maximum operating junction temperature *	150		°C
dV/dt	Critical rate of rise of reverse voltage	10000		V/ $\mu\text{s}$

\* :  $\frac{dP_{tot}}{dT_j} > \frac{1}{R_{th(j-a)}}$  thermal runaway condition for a diode on its own heatsink

**Table 4: Thermal Resistance**

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction to lead	SMA	30
		SMB	25

**Table 5: Static Electrical Characteristics**

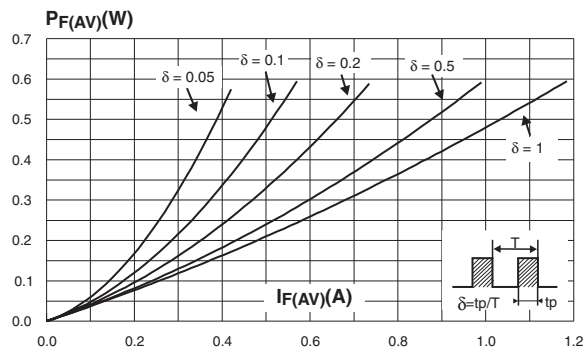
Symbol	Parameter	Tests conditions	Min.	Typ	Max.	Unit
$I_R^*$	Reverse leakage current	$T_j = 25^\circ\text{C}$			12	$\mu\text{A}$
		$T_j = 100^\circ\text{C}$			0.25	2
$V_F^{**}$	Forward voltage drop	$T_j = 25^\circ\text{C}$	$I_F = 1\text{A}$		0.55	V
		$T_j = 125^\circ\text{C}$			0.43	
		$T_j = 25^\circ\text{C}$	$I_F = 2\text{A}$		0.65	
		$T_j = 125^\circ\text{C}$			0.53	

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

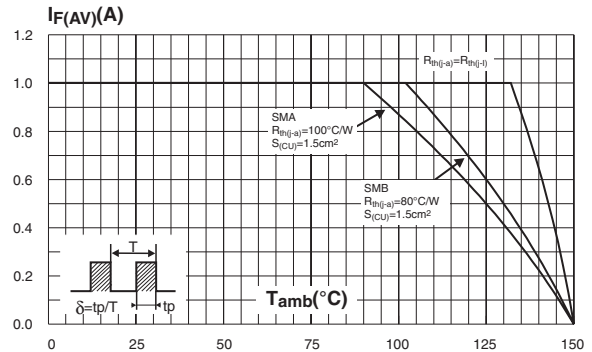
\*\*  $t_p = 380\ \mu\text{s}$ ,  $\delta < 2\%$

To evaluate the conduction losses use the following equation:  $P = 0.4 \times I_{F(AV)} + 0.10 I_{F(RMS)}^2$

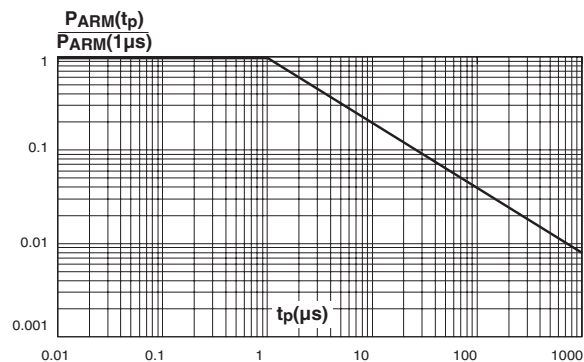
**Figure 1: Average forward power dissipation versus average forward current**



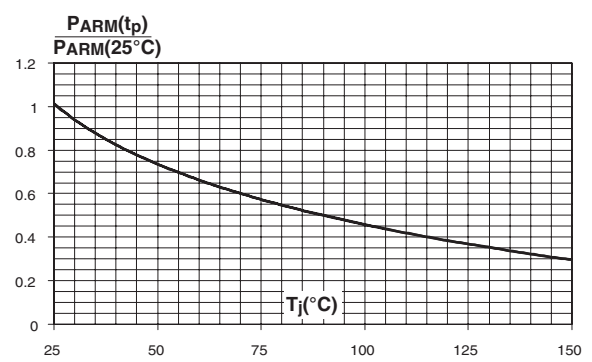
**Figure 2: Average forward current versus ambient temperature (delta = 0.5)**



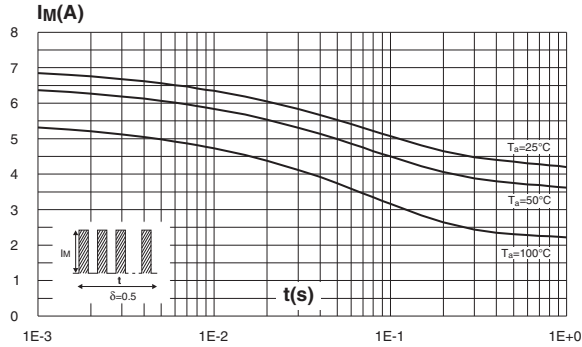
**Figure 3: Normalized avalanche power derating versus pulse duration**



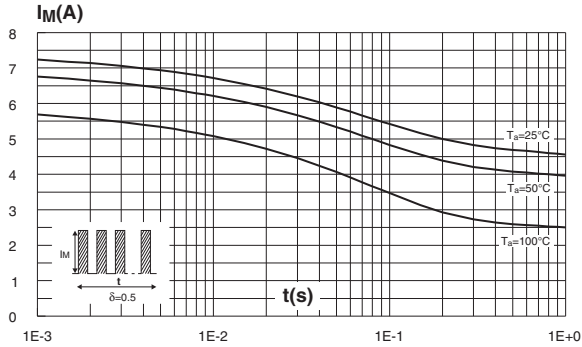
**Figure 4: Normalized avalanche power derating versus junction temperature**



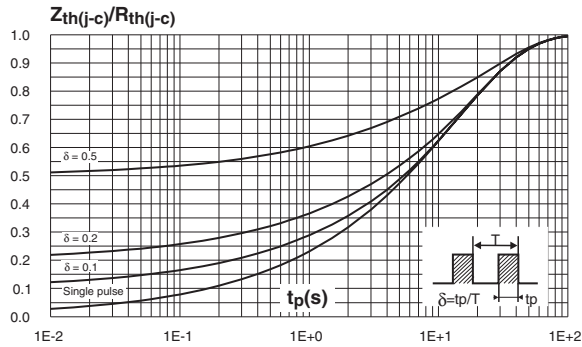
**Figure 5: Non repetitive surge peak forward current versus overload duration (maximum values) (SMA)**



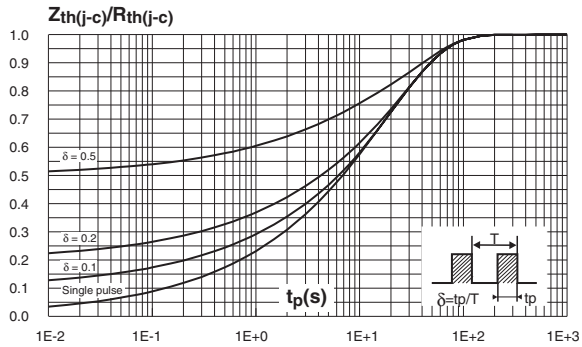
**Figure 6: Non repetitive surge peak forward current versus overload duration (maximum values) (SMB)**



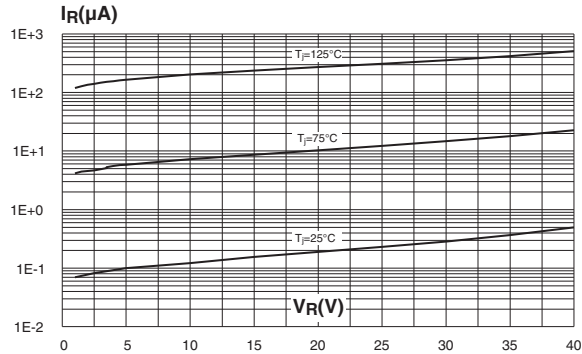
**Figure 7: Relative variation of thermal impedance junction to ambient versus pulse duration (epoxy printed circuit board, e(Cu)=35µm, recommended pad layout) (SMA)**



**Figure 8: Relative variation of thermal impedance junction to ambient versus pulse duration (epoxy printed circuit board, e(Cu)=35µm, recommended pad layout) (SMB)**



**Figure 9: Reverse leakage current versus reverse voltage applied (typical values)**



**Figure 10: Junction capacitance versus reverse voltage applied (typical values)**

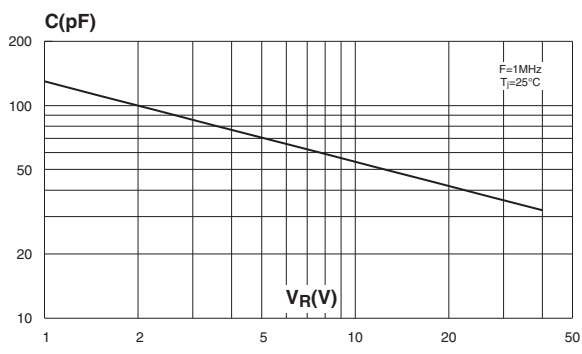


Figure 11: Forward voltage drop versus forward current (maximum values)

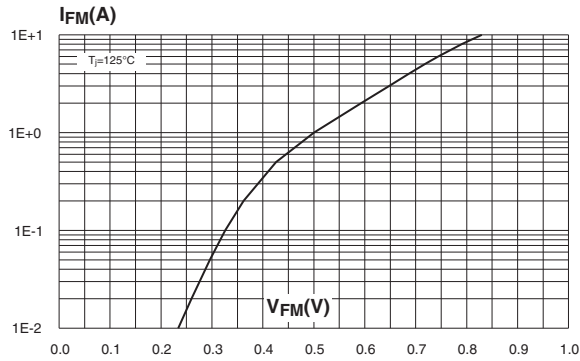


Figure 12: Thermal resistance junction to ambient versus copper surface under each lead (Epoxy printed circuit board FR4, copper thickness: 35 $\mu\text{m}$ ) (SMA)

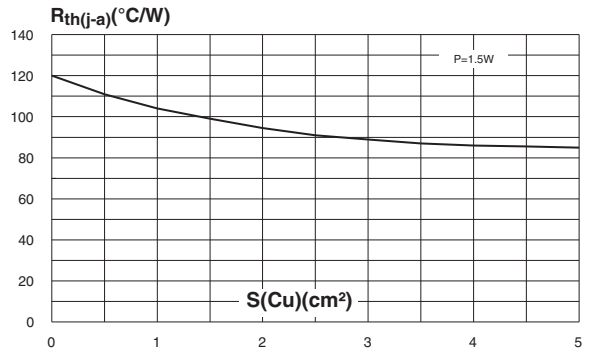


Figure 13: Thermal resistance junction to ambient versus copper surface under each lead (Epoxy printed circuit board FR4, copper thickness: 35 $\mu\text{m}$ ) (SMB)

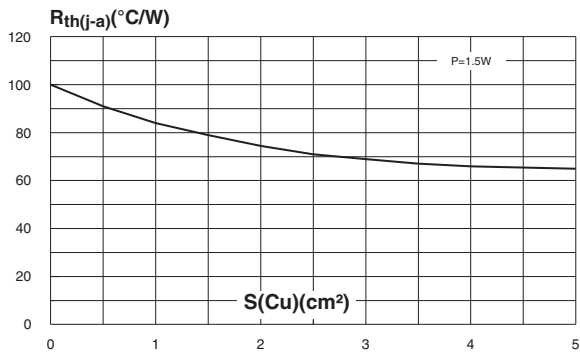


Figure 14: SMA Package Mechanical Data

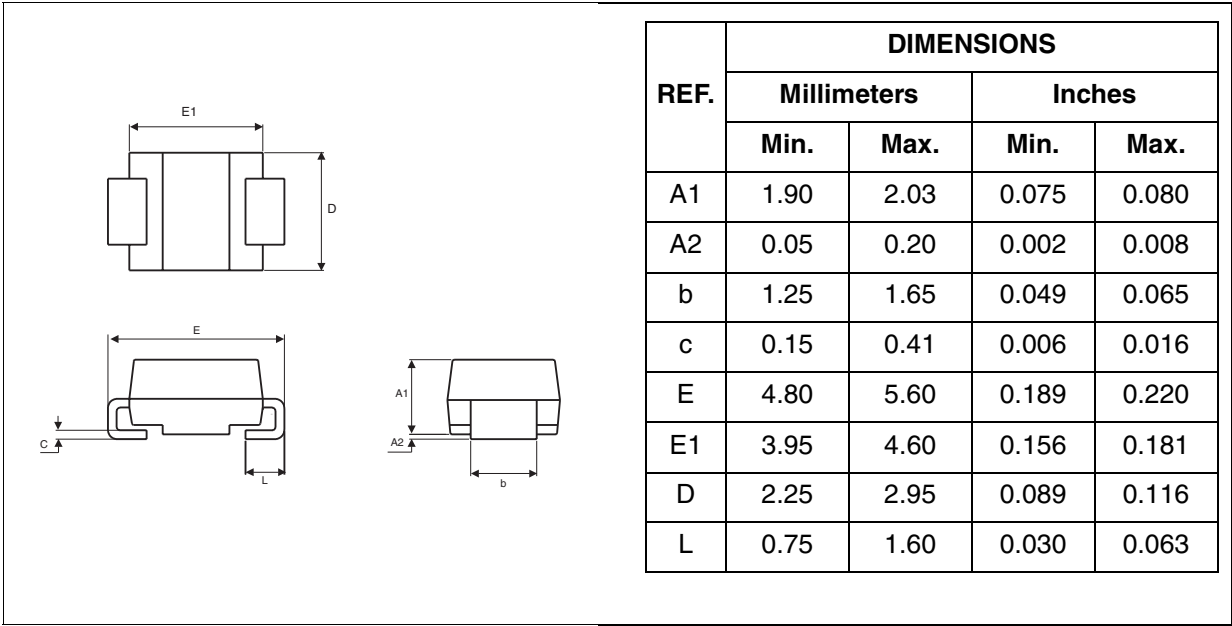


Figure 15: SMA Foot Print Dimensions (in millimeters)

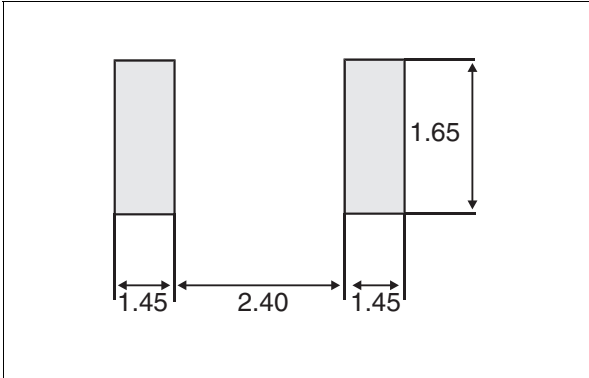


Figure 16: SMB Package Mechanical Data

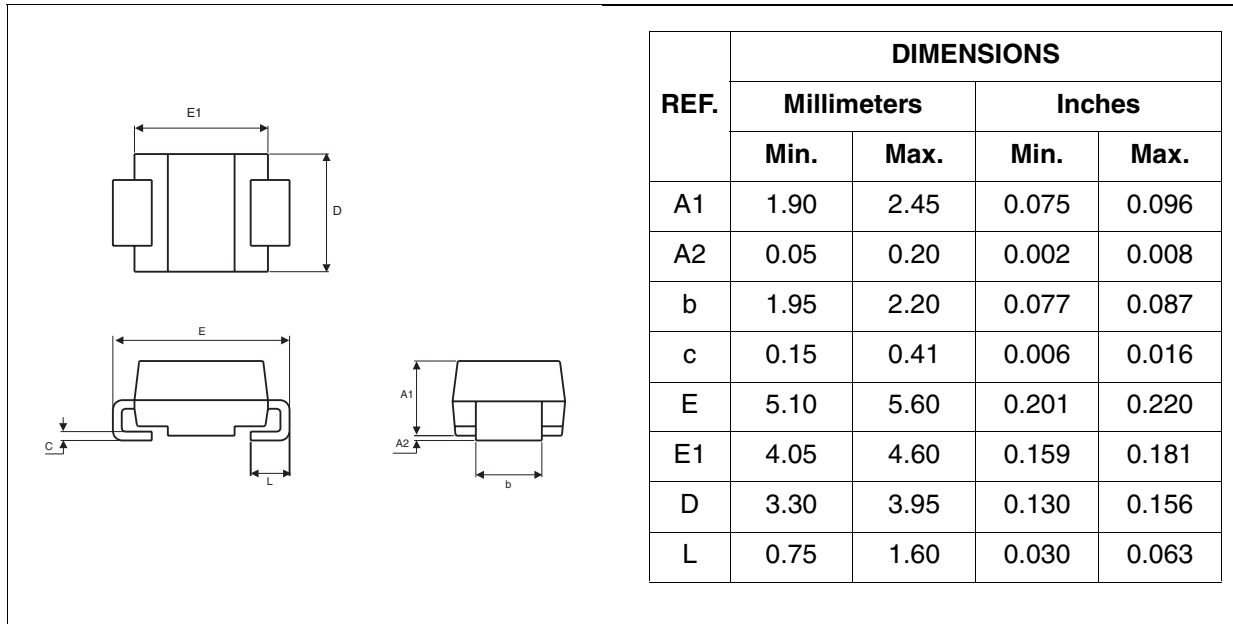
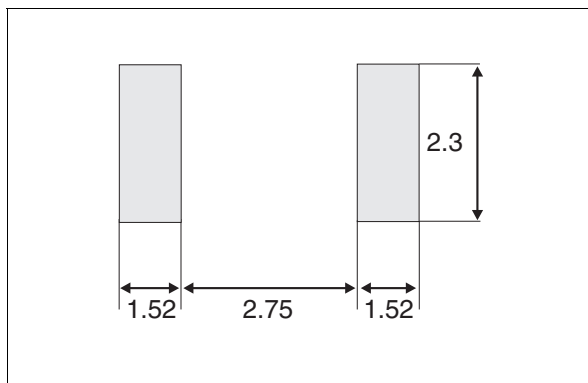


Figure 17: SMB Foot Print Dimensions (in millimeters)



**Table 6: Ordering Information**

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STPS140A	S140	SMA	0.068 g	5000	Tape & reel
STPS140U	G14	SMB	0.107 g	2500	Tape & reel

- Band indicates cathode
- Epoxy meets UL94, V0

**Table 7: Revision History**

Date	Revision	Description of Changes
Jul-2003	7	Last update.
Aug-2004	8	SMA package dimensions update. Reference A1 max. changed from 2.70mm (0.106inc.) to 2.03mm (0.080).

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics.  
All other names are the property of their respective owners

© 2004 STMicroelectronics - All rights reserved

**STMicroelectronics group of companies**

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

[www.st.com](http://www.st.com)