

Automotive low drop power Schottky rectifier

Features

- Very small conduction losses
- Negligible switching losses
- Low forward voltage drop
- Surface mount miniature packages
- Avalanche capability specified
- AEC-Q101 qualified
- ECOPACK[®]2 compliant components

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 in automotive applications.

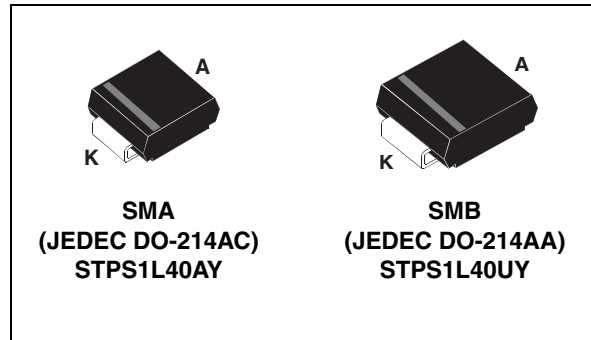


Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	1 A
V_{RRM}	40 V
T_j (max)	150 °C
V_F (max)	0.42 V

1 Characteristics

Table 2. Absolute ratings (limiting values)

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	40	V
$I_{F(RMS)}$	Forward rms current	8	A
$I_{F(AV)}$	Average forward current	$T_L = 130\text{ °C } \delta = 0.5$	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10\text{ ms sinusoidal}$	A
I_{RRM}	Repetitive peak reverse current	$t_p = 2\text{ }\mu\text{s } F = 1\text{ kHz square}$	A
I_{RSM}	Non repetitive peak reverse current	$t_p = 100\text{ }\mu\text{s square}$	A
P_{ARM}	Repetitive peak avalanche power	$t_p = 1\text{ }\mu\text{s } T_j = 25\text{ °C}$	W
T_{stg}	Storage temperature range	- 65 to + 150	°C
T_j	Operating junction temperature range ⁽¹⁾	-40 to + 150	°C
dV/dt	Critical rate of rise of reverse voltage	10000	V/ μ s

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

Table 3. Thermal resistance

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

Table 4. Static electrical characteristics

Symbol	Parameter	Tests conditions	Min.	Typ.	Max.	Unit	
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	-	-	35	μ A	
		$T_j = 125\text{ °C}$	-	6	10	mA	
$V_F^{(1)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 1\text{ A}$	-	-	0.5	V
		$T_j = 125\text{ °C}$		-	0.37	0.42	
		$T_j = 25\text{ °C}$	$I_F = 2\text{ A}$	-	-	0.63	
		$T_j = 125\text{ °C}$		-	0.5	0.61	

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

To evaluate the conduction losses use the following equation:

$$P = 0.23 \times I_{F(AV)} + 0.19 I_{F(RMS)}^2$$

Figure 1. Average forward power dissipation versus average forward current

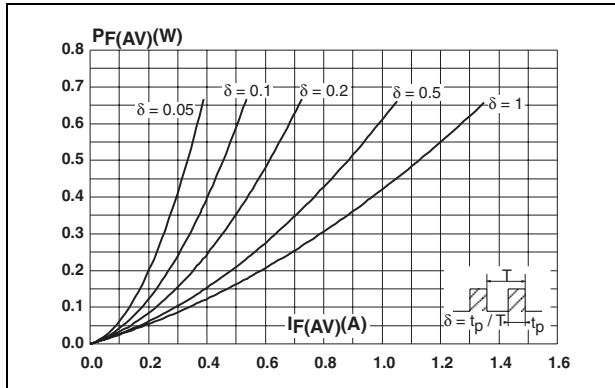


Figure 2. Average forward current versus ambient temperature (SMA, $\delta = 0.5$)

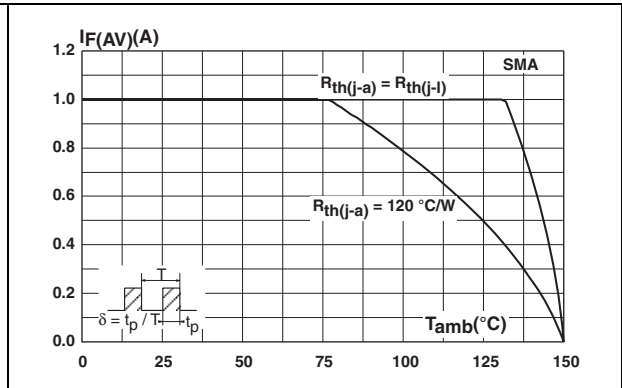


Figure 3. Average forward current versus ambient temperature (SMB, $\delta = 0.5$)

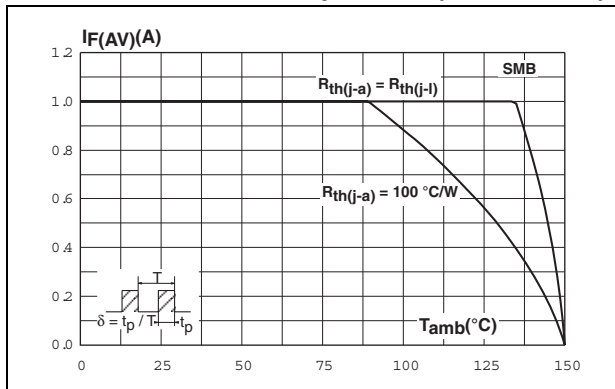


Figure 4. Normalized avalanche power derating versus pulse duration

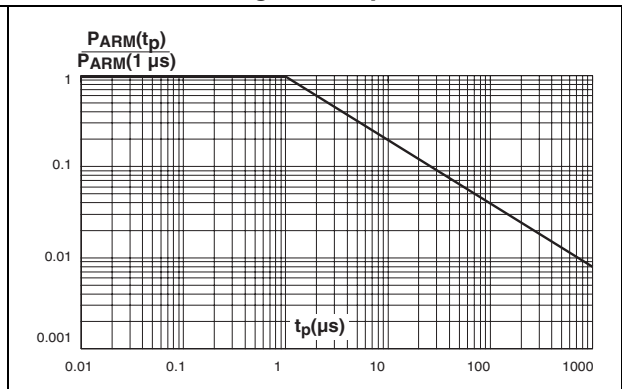


Figure 5. Normalized avalanche power derating versus junction temperature

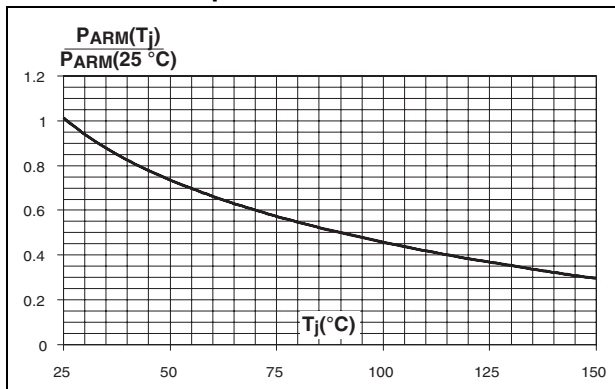


Figure 6. Non repetitive surge peak forward current versus overload duration (maximum values, SMA)

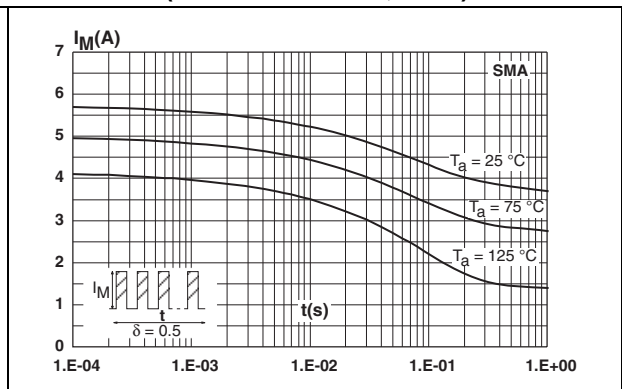


Figure 7. Non repetitive surge peak forward current versus overload duration (maximum values, SMB)

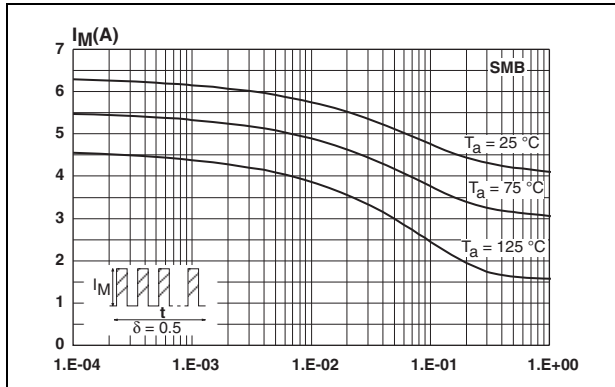


Figure 8. Relative variation of thermal impedance junction to ambient versus pulse duration (SMA)

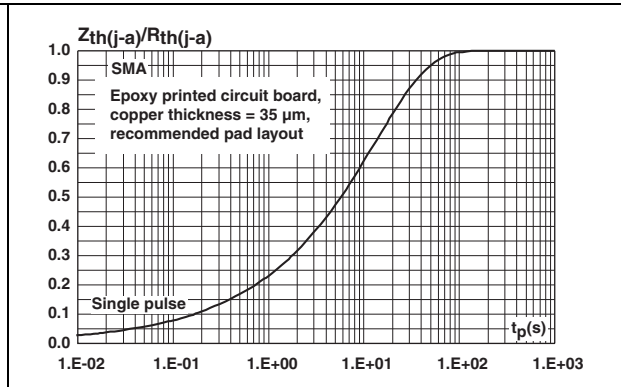


Figure 9. Relative variation of thermal impedance junction to ambient versus pulse duration (SMB)

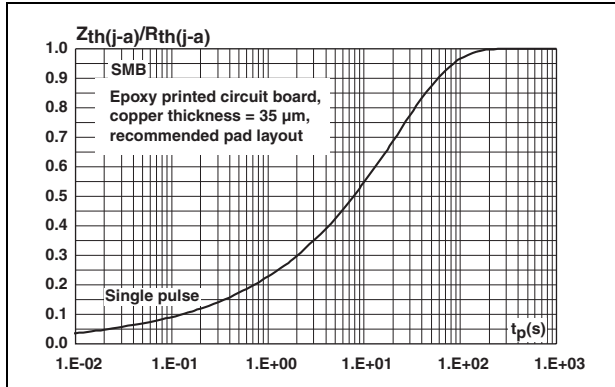


Figure 10. Reverse leakage current versus reverse voltage applied (typical values)

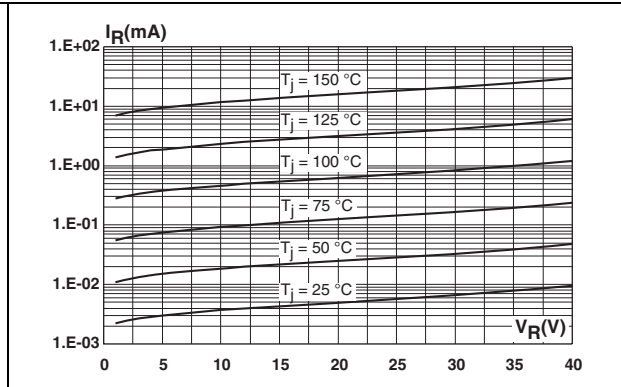


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

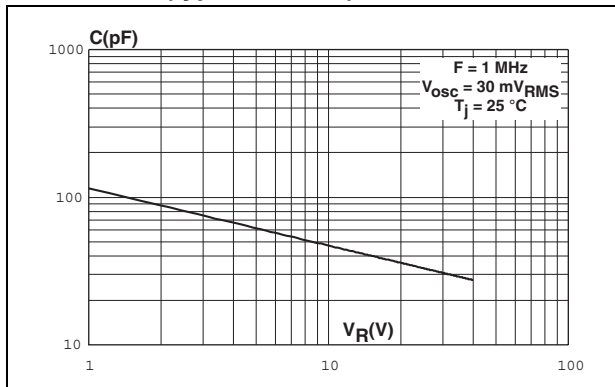


Figure 12. Forward voltage drop versus forward current (typical values, high level)

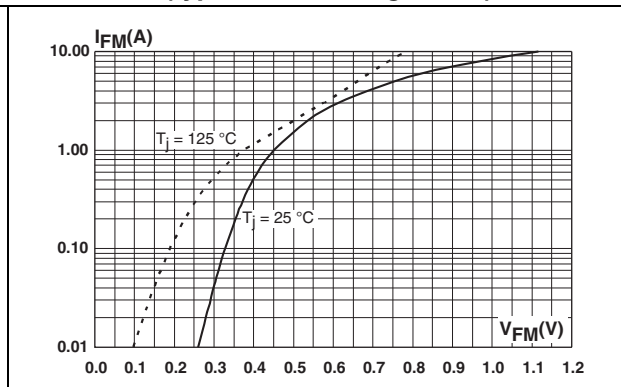


Figure 13. Forward voltage drop versus forward current (typical values, low level)

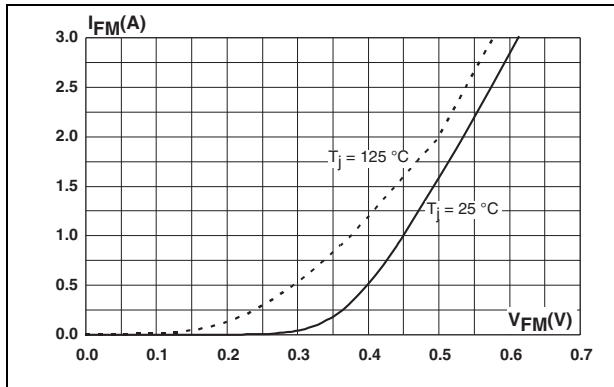


Figure 14. Thermal resistance junction to ambient versus copper surface under each lead (SMA)

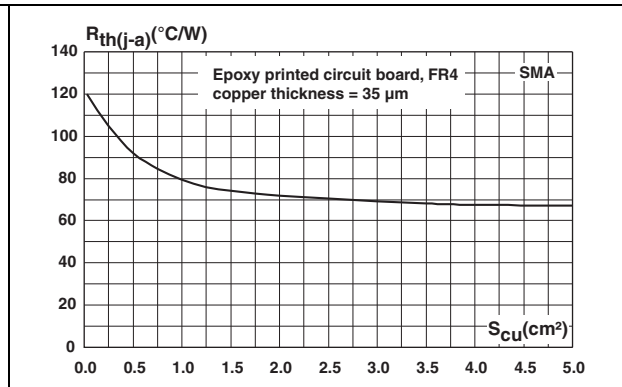
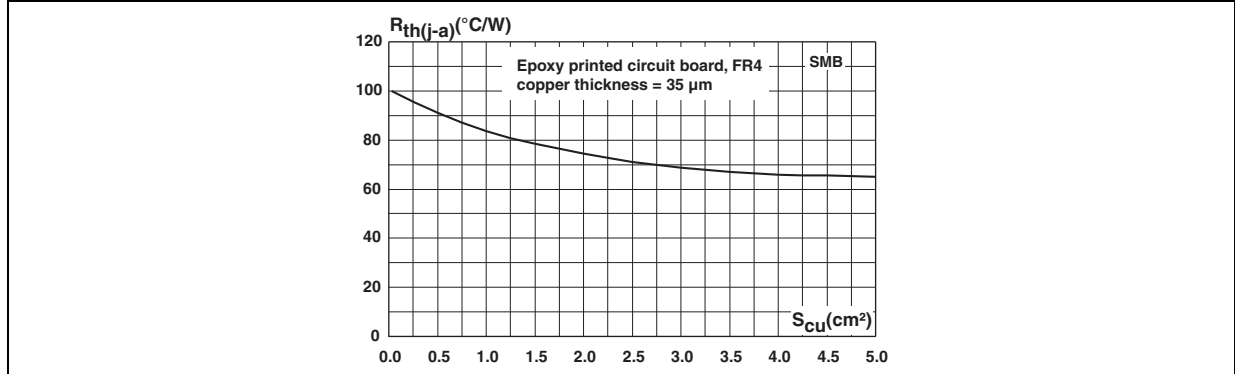


Figure 15. Thermal resistance junction to ambient versus copper surface under each lead (SMB)



2 Package information

- Epoxy meets UL94, V0
- Cathode band (SMA, SMB)

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. ECOPACK® is an ST trademark.

Table 5. SMA dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.094
A2	0.05	0.20	0.002	0.008
b	1.25	1.65	0.049	0.065
c	0.15	0.40	0.006	0.016
D	2.25	2.90	0.089	0.114
E	4.80	5.35	0.189	0.211
E1	3.95	4.60	0.156	0.181
L	0.75	1.50	0.030	0.059

Figure 16. Footprint, dimensions in mm (inches)

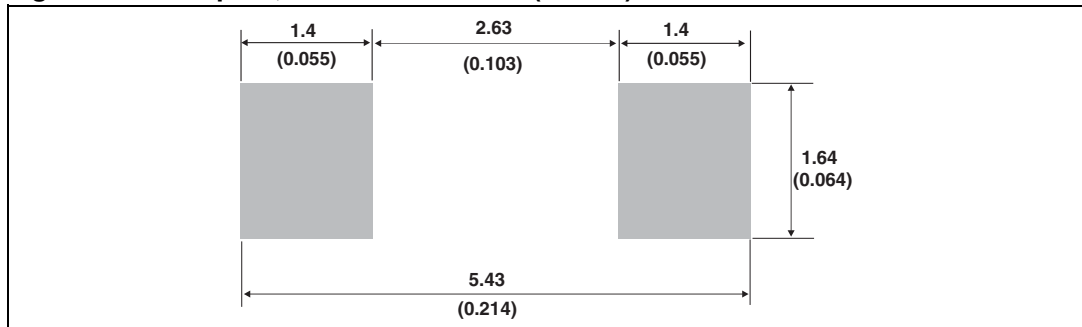
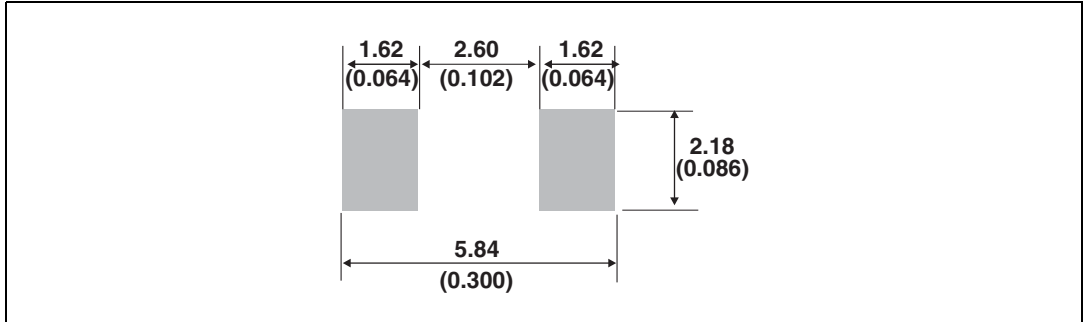


Table 6. SMB dimensions

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
D	3.30	3.95	0.130	0.156
E	5.10	5.60	0.201	0.220
E1	4.05	4.60	0.159	0.181
L	0.75	1.50	0.030	0.059

Figure 17. Footprint, dimensions in mm (inches)



3 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS1L40AY	GB4Y	SMA	0.068 g	5000	Tape and reel
STPS1L40UY	GC4Y	SMB	0.107 g	2500	Tape and reel

4 Revision history

Table 8. Document revision history

Date	Revision	Changes
21-Oct-2011	1	First issue.

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY TWO AUTHORIZED ST REPRESENTATIVES, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

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

© 2011 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 - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com