

Automotive high voltage power Schottky rectifier

Features

- Negligible switching losses
- High junction temperature capability
- Low leakage current
- Good trade-off between leakage current and forward voltage drop
- Avalanche capability specified
- ECOPACK®2 compliant component
- AEC-Q101 qualified

Description

Schottky rectifiers packaged in SMA or SMB, and designed for high frequency miniature switched mode power supplies as DC/DC converters for automotive applications.

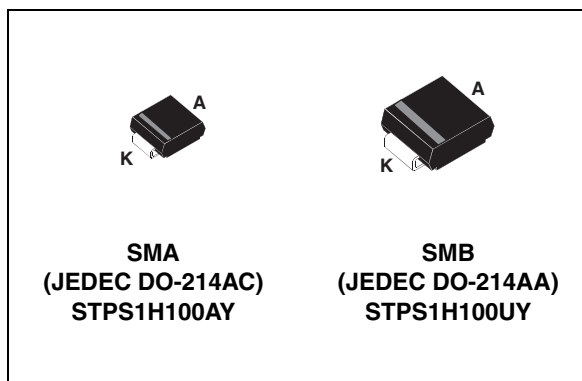


Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	1 A
V_{RRM}	100 V
$T_j(max)$	175 °C
$V_F(max)$	0.62 V

1 Characteristics

Table 2. Absolute ratings (limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		100	V
$I_{F(RMS)}$	Forward rms voltage		10	A
$I_{F(AV)}$	Average forward current	$T_L = 160\text{ °C } \delta = 0.5$	1	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10\text{ ms sinusoidal}$	50	A
I_{RRM}	Repetitive peak reverse current	$t_p = 2\text{ }\mu\text{s } F = 1\text{ kHz square}$	1	A
I_{RSM}	Non repetitive peak reverse current	$t_p = 100\text{ }\mu\text{s square}$	1	A
P_{ARM}	Repetitive peak avalanche power	$t_p = 1\text{ }\mu\text{s } T_j = 25\text{ °C}$	1500	W
T_{stg}	Storage temperature range		- 65 to + 175	°C
T_j	Operating junction temperature ⁽¹⁾		- 40 to + 175	°C
dV/dt	Critical rate of rise of reverse voltage		10000	V/ μs

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	°C/W
		SMB	25	

Table 4. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$			4	μA
		$T_j = 125\text{ °C}$			0.2	0.5	mA
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 1\text{ A}$			0.77	V
		$T_j = 125\text{ °C}$			0.58	0.62	
		$T_j = 25\text{ °C}$	$I_F = 2\text{ A}$			0.86	
		$T_j = 125\text{ °C}$			0.65	0.7	

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:

$$P = 0.54 \times I_{F(AV)} + 0.08 I_{F(RMS)}^2$$

Figure 1. Average forward power dissipation versus average forward current

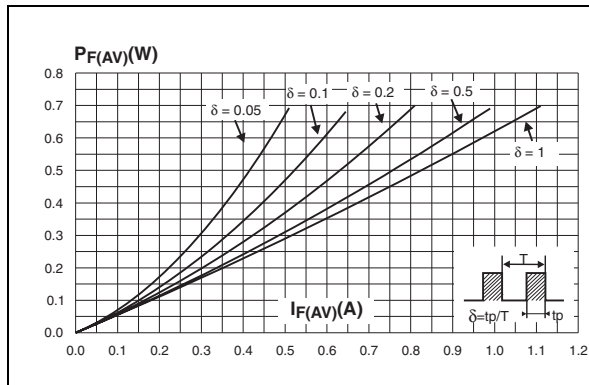


Figure 2. Average forward current versus ambient temperature ($\delta = 0.5$)

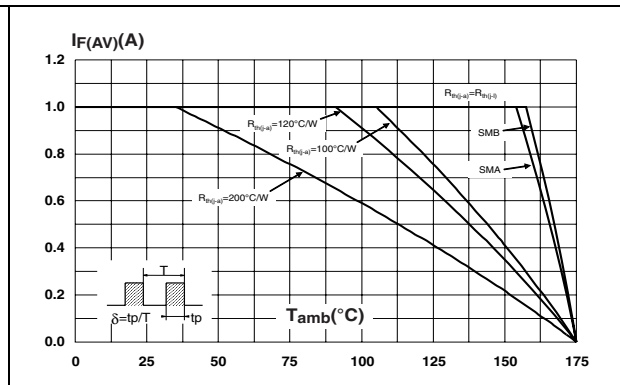


Figure 3. Normalized avalanche power derating versus pulse duration

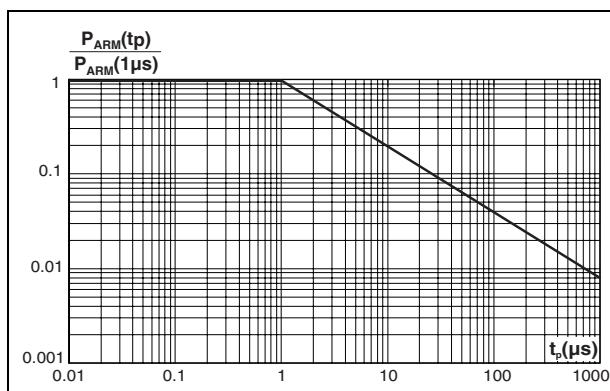


Figure 4. Normalized avalanche power derating versus junction temperature

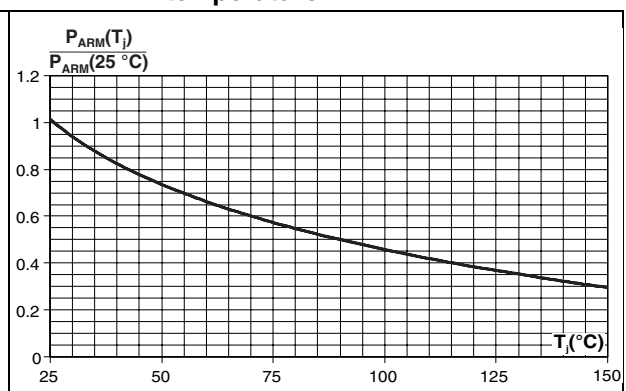


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values) (SMB)

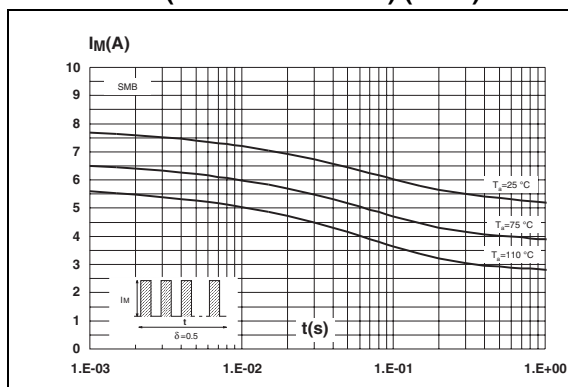


Figure 6. Non repetitive surge peak forward current versus overload duration (maximum values) (SMA)

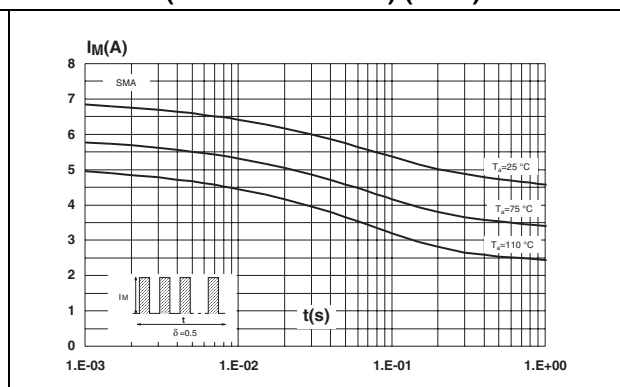


Figure 7. Relative variation of thermal impedance junction to ambient versus pulse duration (SMB)

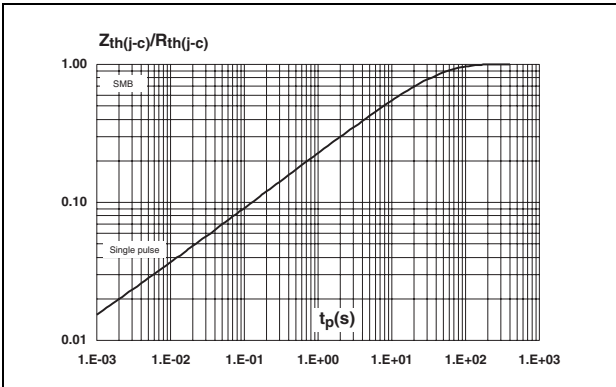


Figure 8. Relative variation of thermal impedance junction to ambient versus pulse duration (SMA)

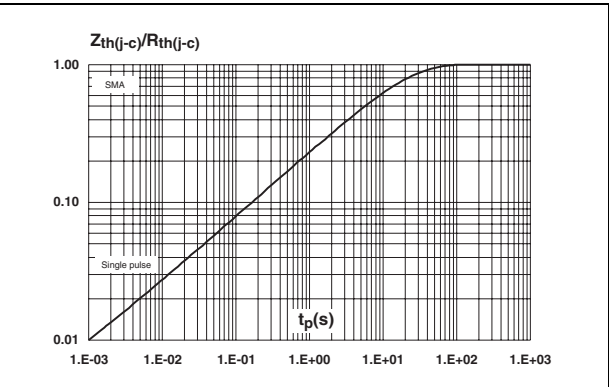


Figure 9. Reverse leakage current versus reverse voltage applied (typical values)

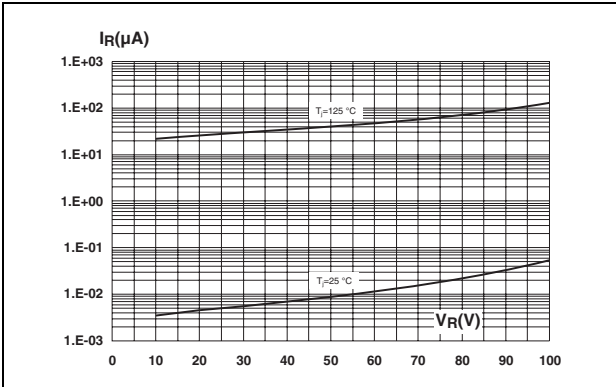


Figure 10. Junction capacitance versus reverse voltage applied (typical values)

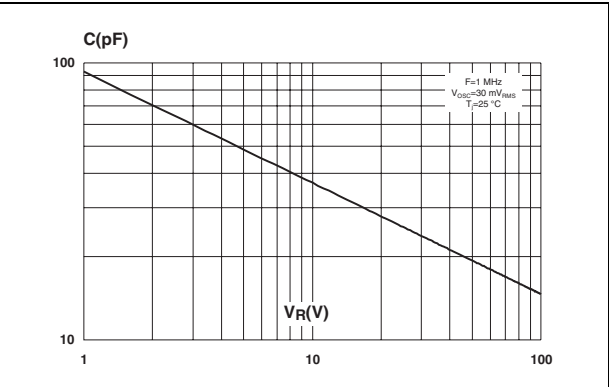


Figure 11. Forward voltage drop versus forward current (maximum values)

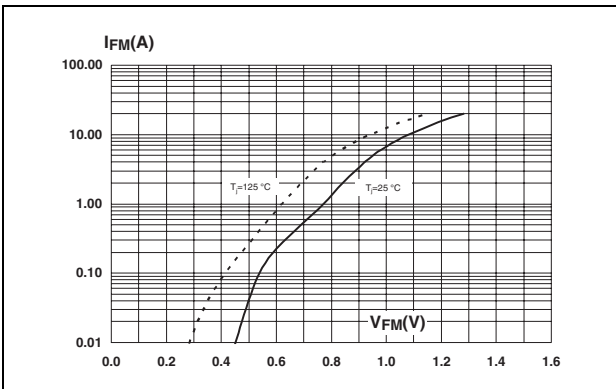


Figure 12. Thermal resistance junction to ambient versus copper surface under each lead (SMB)

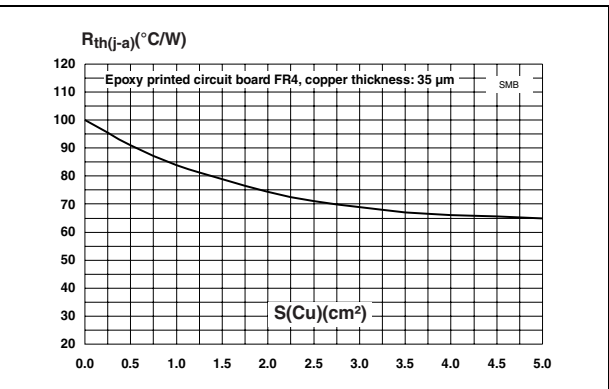
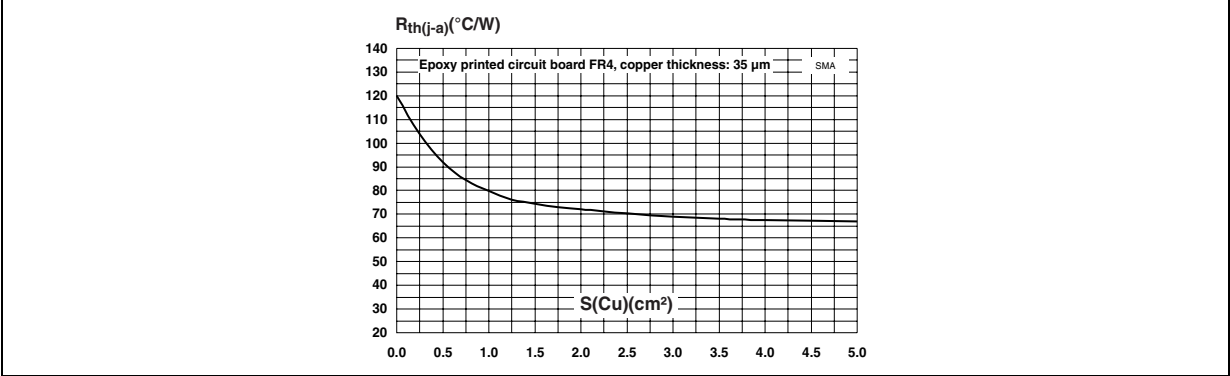


Figure 13. Thermal resistance junction to ambient versus copper surface under each lead (SMA)



2 Package information

- Epoxy meets UL94, V0
- Lead-free package

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.

Figure 14. SMA package dimensions

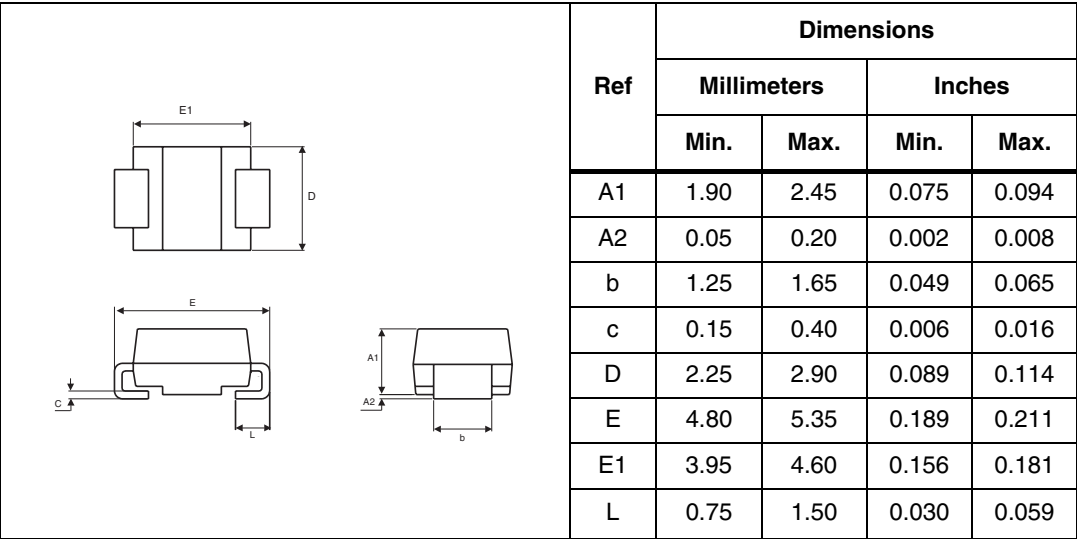


Figure 15. SMA footprint dimensions in millimeters (inches)

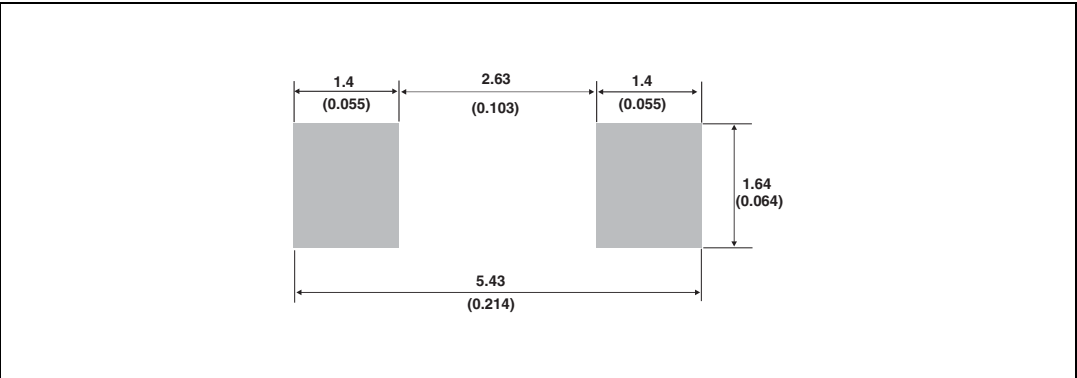


Figure 16. SMB package dimensions

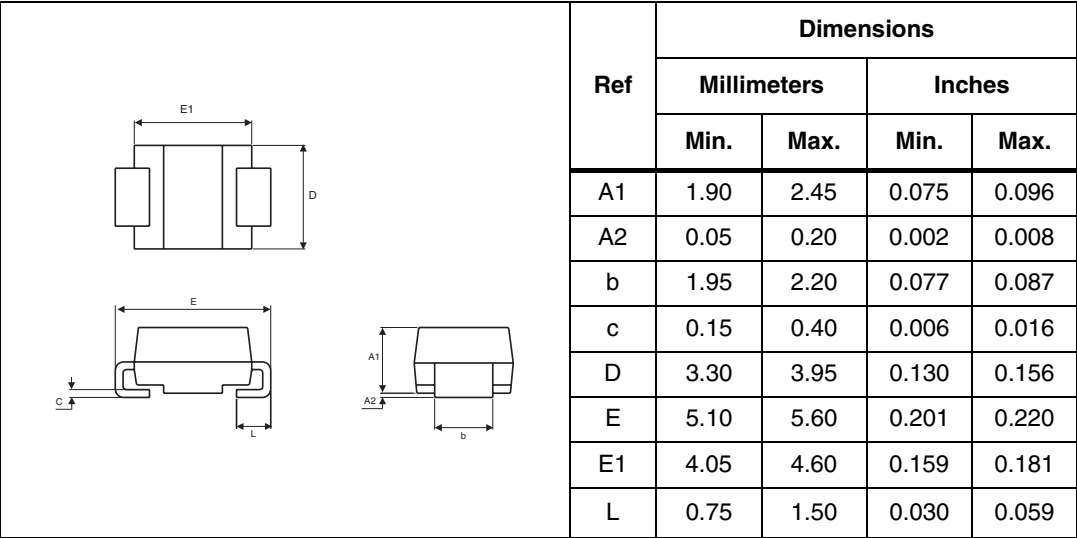
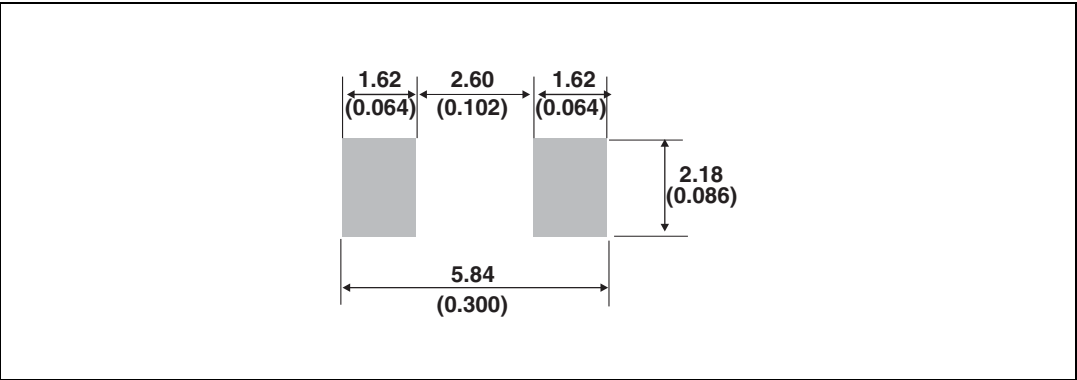


Figure 17. SMB footprint dimensions in millimeters (inches)



3 Ordering information

Table 5. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS1H100AY	S11Y	SMA	0.068 g	5000	Tape and reel
STPS1H100UY	G11Y	SMB	0.107 g	2500	Tape and reel

4 Revision history

Table 6. Document revision history

Date	Revision	Changes
03-Dec-2010	1	First issue.

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