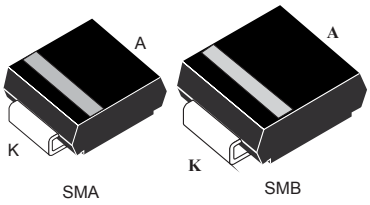
STPS1H100-Y

Datasheet

Automotive high voltage power Schottky rectifier



Features

- AEC-Q101 qualified
- 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
- PPAP capable
- V_{RRM} guaranteed from -40°C to +175°C

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. It is particularly suited for LED lighting applications, ADAS power, and ECU (Engine Control Unit) in automotive environment.

Product status	
STPS1H100-Y	
Product summary	
Symbol	**Value**
$I_{F(AV)}$	1 A
V_{RRM}	100 V
T_j (range)	-40 °C to +175 °C
$V_{F(max.)}$	0.62 V

1 Characteristics

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

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage, T_j = -40 °C to +175 °C			100	V
$I_{F(RMS)}$	Forward rms current			10	A
$I_{F(AV)}$	Average forward current, δ = 0.5	SMA	T_L = 150 °C	1	A
		SMB	T_L = 155 °C		
I_{FSM}	Surge non repetitive forward current		t_p = 10 ms sinusoidal	50	A
P_{ARM}	Repetitive peak avalanche power		t_p = 10 µs, T_j = 125 °C	108	W
T_{stg}	Storage temperature range			-65 to +175	°C
T_j	Maximum operating junction temperature(1)			+175	°C

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

Table 2. Thermal parameters

Symbol	Parameter		Max. value	Unit
$R_{th(j-l)}$	Junction to lead	SMA	30	°C/W
		SMB	25	

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-		4	µA
		T_j = 125 °C		-	0.2	0.5	mA
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 1 A	-		0.77	V
		T_j = 125 °C		-	0.58	0.62	
		T_j = 25 °C	I_F = 2 A	-		0.86	
		T_j = 125 °C		-	0.65	0.70	

1. *Pulse test: tp = 5 ms, δ < 2%*
2. *Pulse test: t_p = 380 µs, δ < 2%*

To evaluate the conduction losses, use the following equation:

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

1.1 Characteristics (curves)

Figure 1. Average forward power dissipation versus average forward current

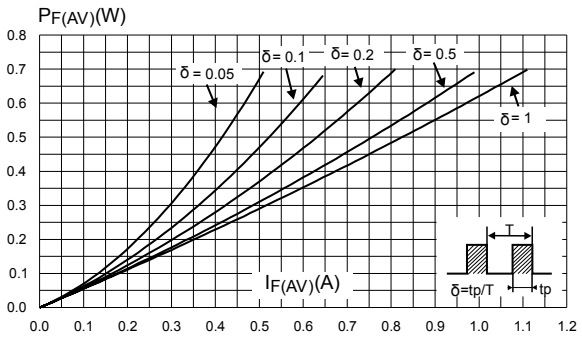


Figure 2. Average forward current versus ambient temperature (δ = 0.5)

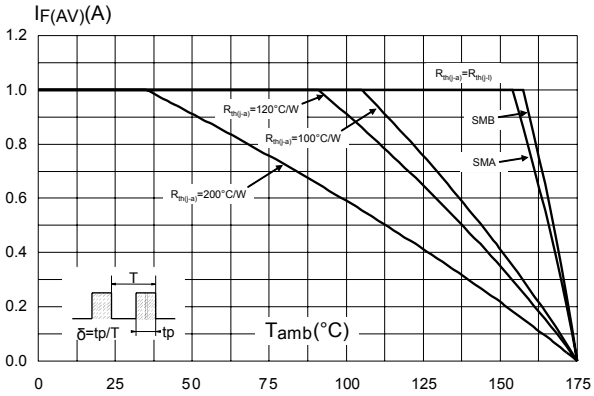


Figure 3. Normalized avalanche power derating versus junction temperature (T_j = 125 °C)

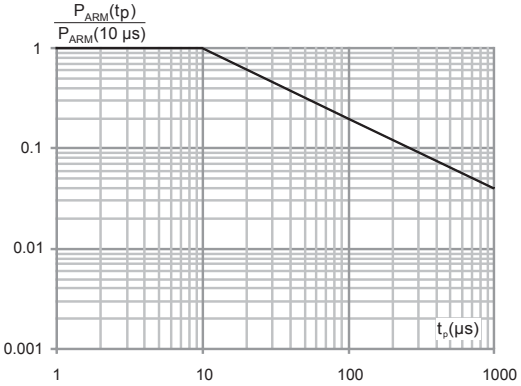


Figure 4. Relative variation of thermal impedance junction to ambient versus pulse duration (SMA)

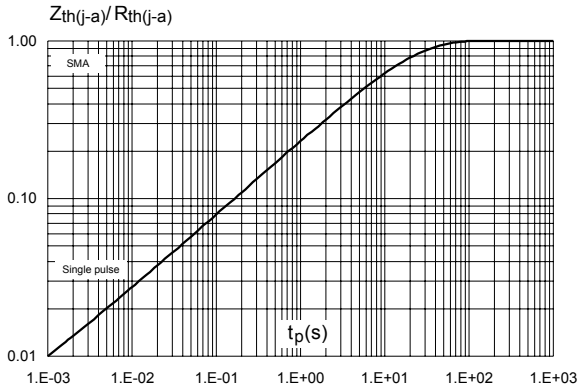


Figure 5. Relative variation of thermal impedance junction to ambient versus pulse duration (SMB)

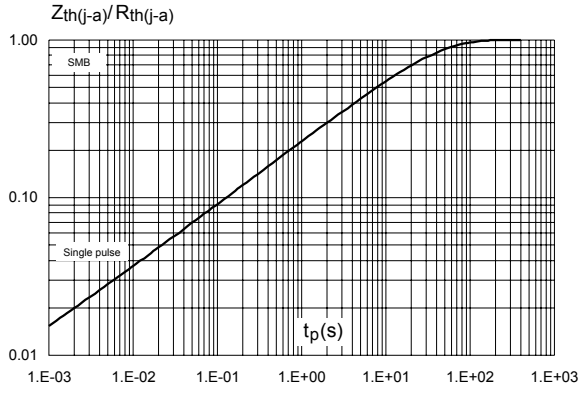


Figure 6. Reverse leakage current versus reverse voltage applied (typical values)

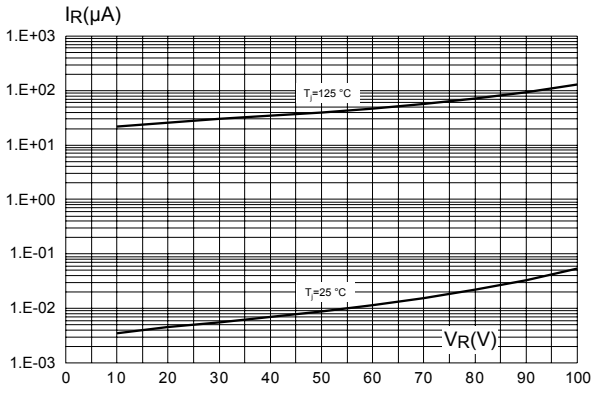


Figure 7. Junction capacitance versus reverse voltage applied (typical values)

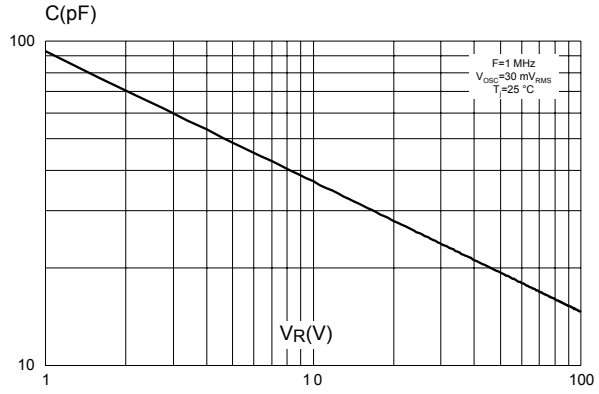


Figure 8. Forward voltage drop versus forward current (maximum values)

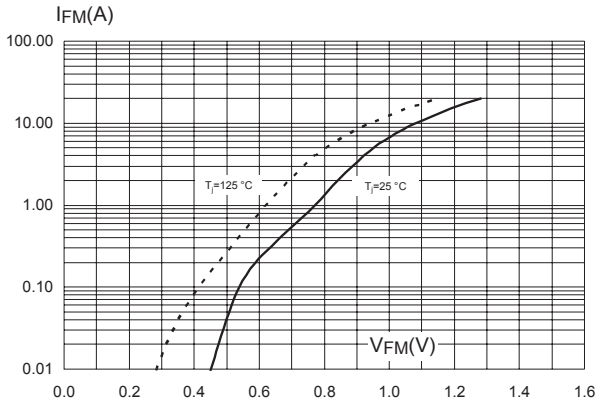


Figure 9. Thermal resistance junction to ambient versus copper surface under each lead (SMB)

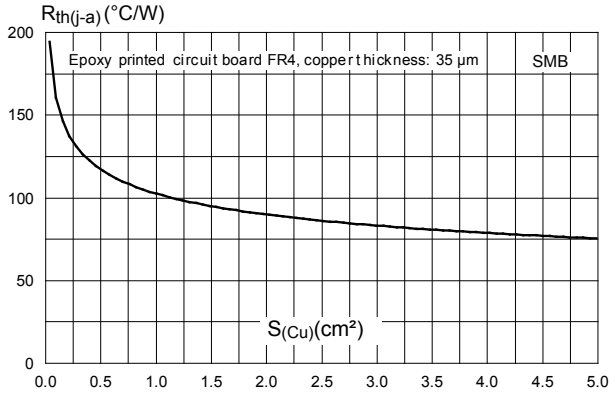
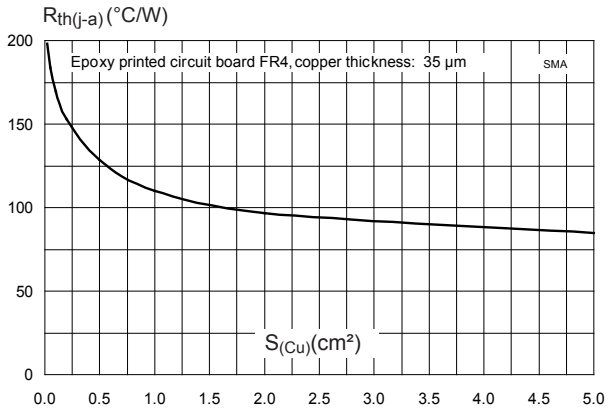


Figure 10. Thermal resistance junction to ambient versus copper surface under each lead (SMA)



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. ECOPACK® is an ST trademark.

2.1 SMB package information

- Epoxy meets UL94, V0
- Lead-free package

Figure 11. SMB package outline

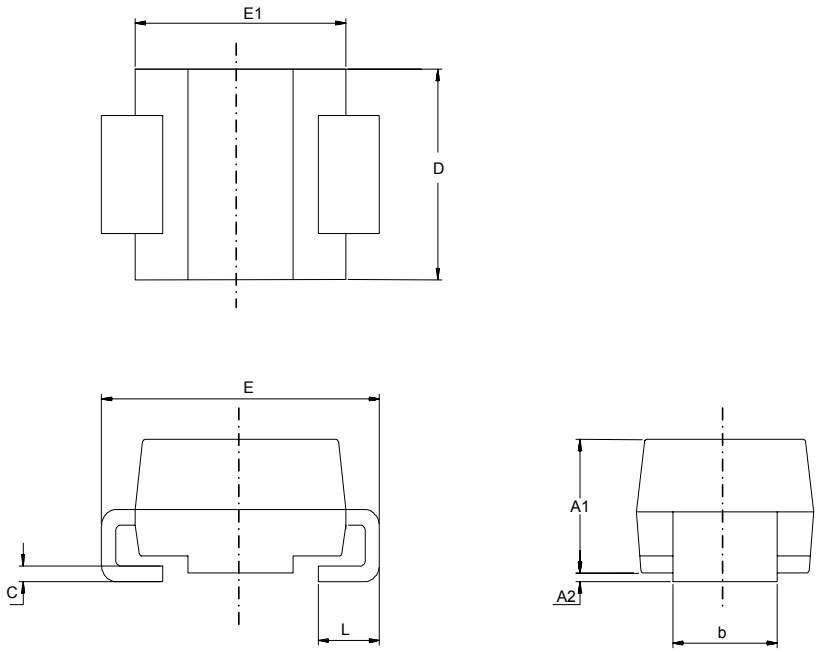
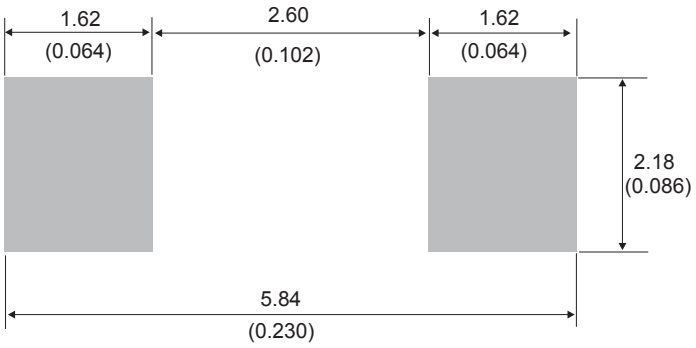


Table 4. **SMB package mechanical data**

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.0748	0.0965
A2	0.05	0.20	0.0020	0.0079
b	1.95	2.20	0.0768	0.0867
c	0.15	0.40	0.0059	0.0157
D	3.30	3.95	0.1299	0.1556
E	5.10	5.60	0.2008	0.2205
E1	4.05	4.60	0.1594	0.1811
L	0.75	1.50	0.0295	0.0591

Figure 12. **SMB recommended footprint**



2.2 SMA package information

- Epoxy meets UL94, V0
- Lead-free package

Figure 13. SMA package outline

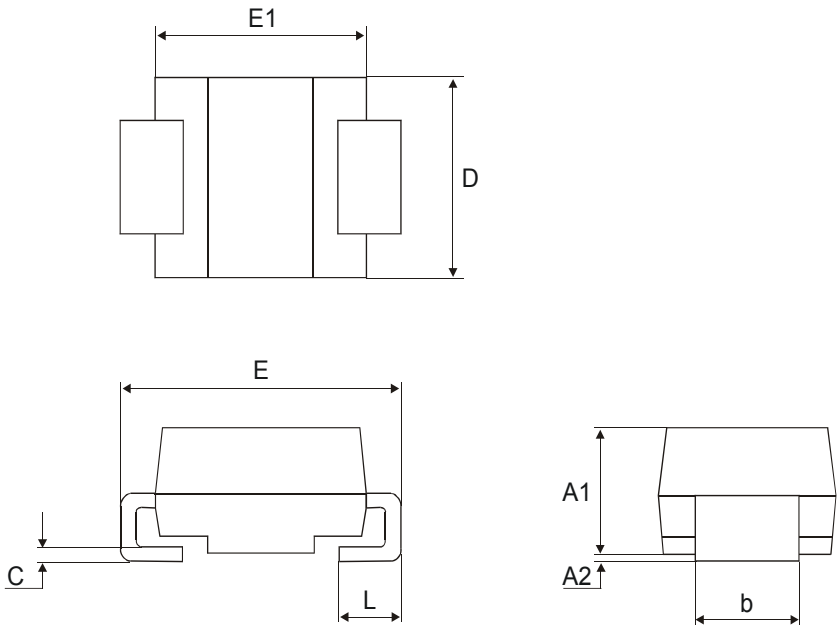
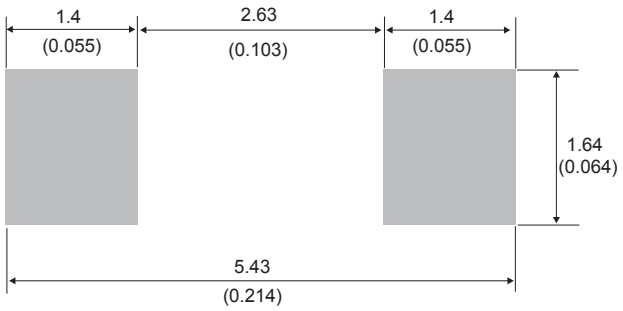


Table 5. SMA package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.097
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 14. **SMA recommended footprint in mm (inches)**



3 Ordering Information

Table 6. **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	2500	

Revision history

Table 7. **Document revision history**

Date	Version	Changes
3-Dec-2010	1	Initial release.
10-Apr-2018	2	Update Figure 3 "Normalized avalanche power derating versus pulse duration" with P_{ARM} 10 µs curve.

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