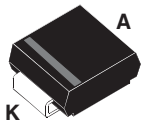
STPS1L40-Y

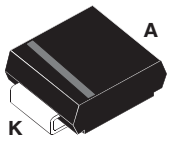
Automotive low drop power Schottky rectifier

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



SMA
(JEDEC DO-214AC)
STPS1L40AY



SMB
(JEDEC DO-214AA)
STPS1L40UY

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

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.

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 °C δ = 0.5	1	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	60	A
I_{RRM}	Repetitive peak reverse current	t_p = 2 µs F = 1 kHz square	1	A
I_{RSM}	Non repetitive peak reverse current	t_p = 100 µs square	1	A
P_{ARM}	Repetitive peak avalanche power	t_p = 1 µs T_j = 25 °C	900	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/µs

1. $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ 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	Tests conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-	-	35	µA
		T_j = 125 °C		-	6	10	mA
V_F (1)	Forward voltage drop	T_j = 25 °C	I_F = 1 A	-	-	0.5	V
		T_j = 125 °C		-	0.37	0.42	
		T_j = 25 °C	I_F = 2 A	-	-	0.63	
		T_j = 125 °C		-	0.5	0.61	

1. Pulse test: t_p = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation:
$P = 0.23 \times I_{F(AV)} + 0.19\ I_F{}^2{}_{(RMS)}$

Figure 1. Average forward power dissipation versus average forward current

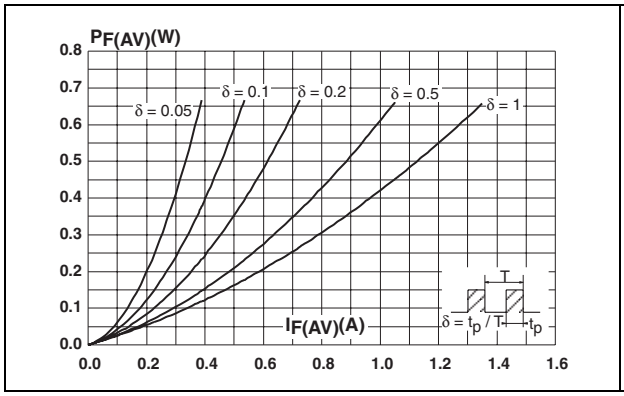


Figure 2. Average forward current versus ambient temperature (SMA, δ = 0.5)

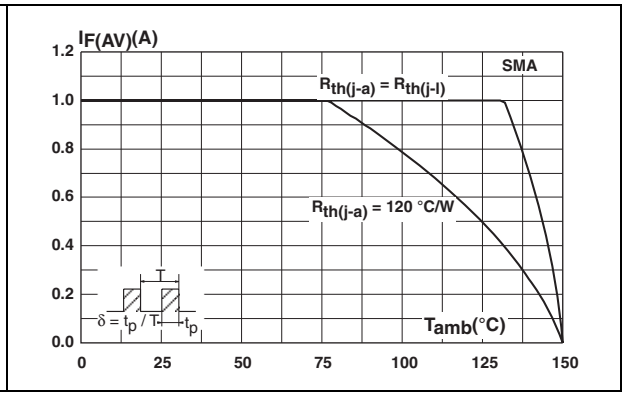


Figure 3. Average forward current versus ambient temperature (SMB, δ = 0.5)

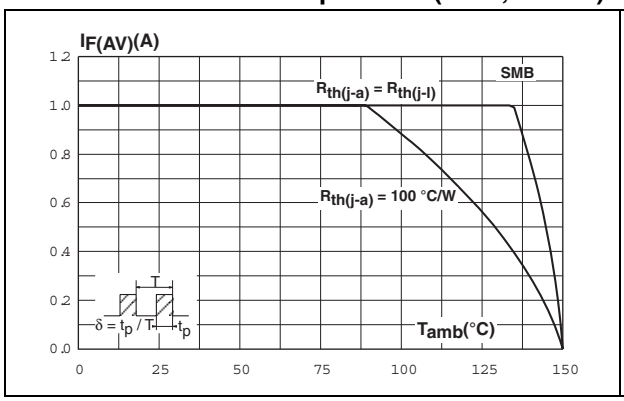


Figure 4. Normalized avalanche power derating versus pulse duration

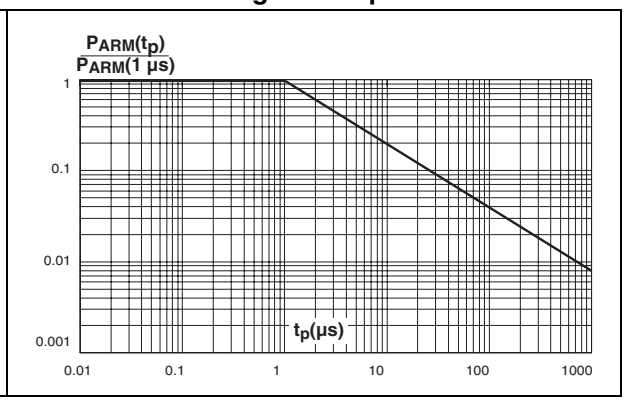


Figure 5. Normalized avalanche power derating versus junction temperature

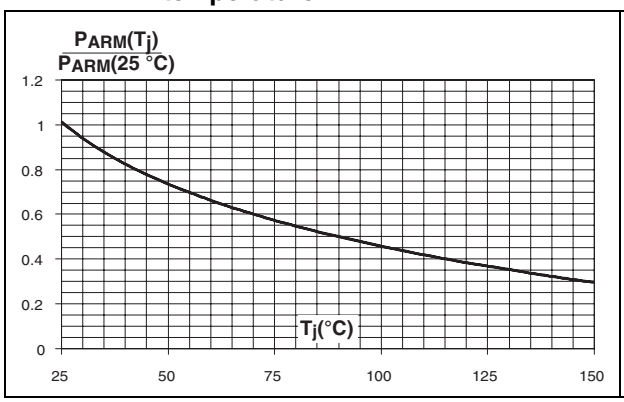


Figure 6. Non repetitive surge peak forward current versus overload duration (maximum values, SMA)

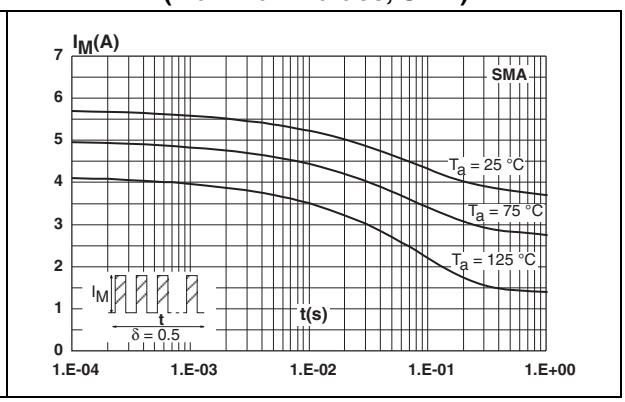


Figure 7. Non repetitive surge peak forward current versus overload duration (maximum values, SMB)

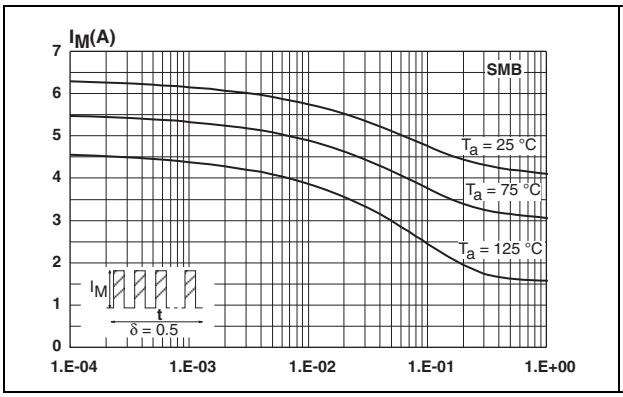


Figure 8. Relative variation of thermal impedance junction to ambient versus pulse duration (SMA)

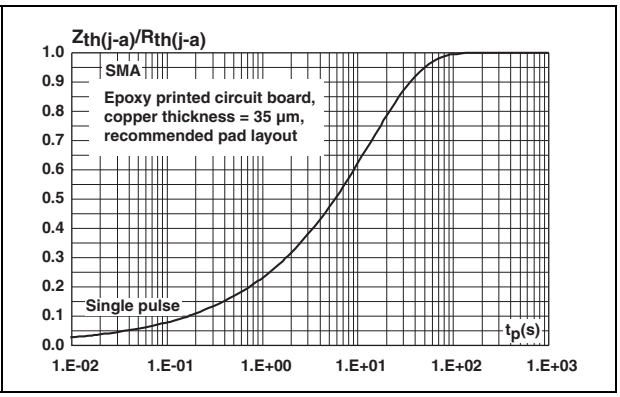


Figure 9. Relative variation of thermal impedance junction to ambient versus pulse duration (SMB)

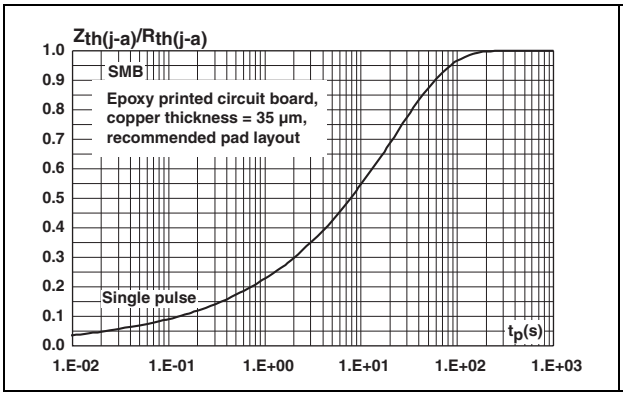


Figure 10. Reverse leakage current versus reverse voltage applied (typical values)

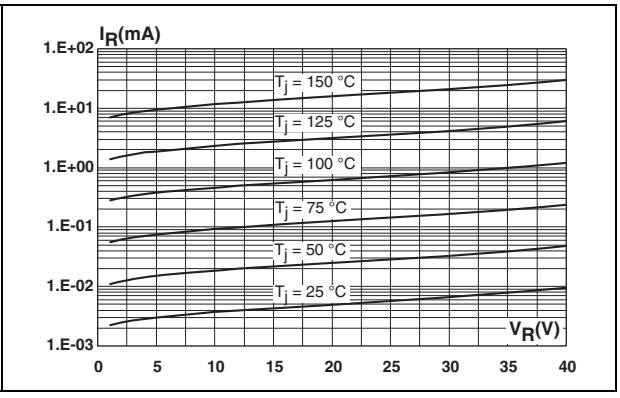


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

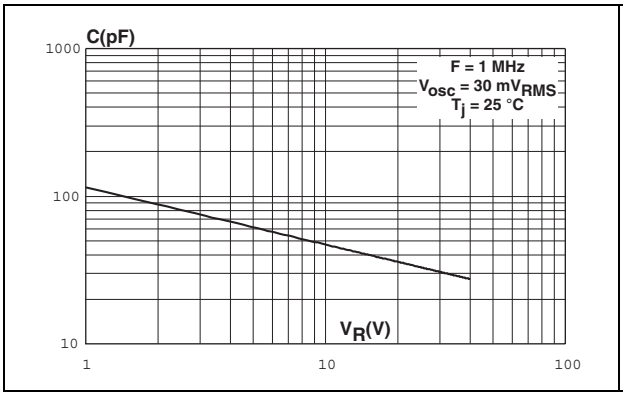


Figure 12. Forward voltage drop versus forward current (typical values, high level)

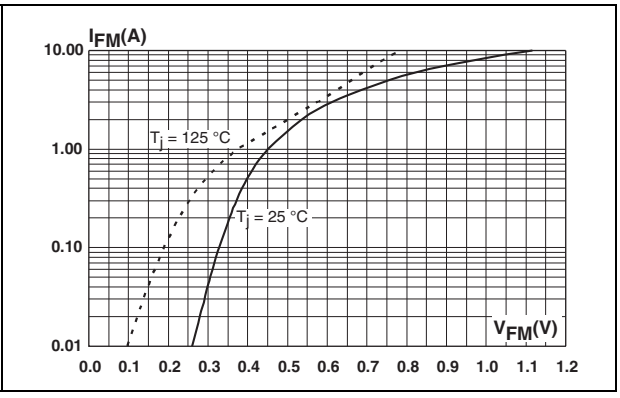


Figure 13. Forward voltage drop versus forward current (typical values, low level)

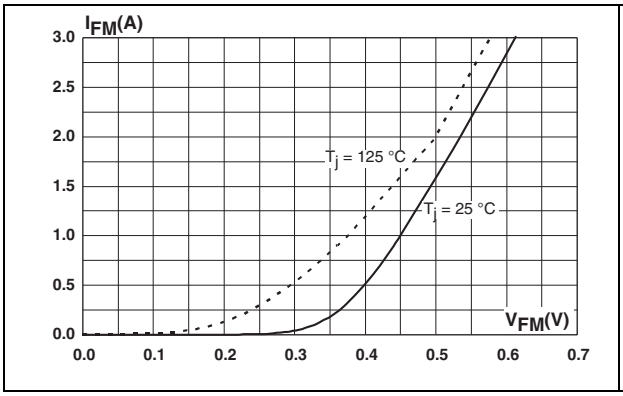


Figure 14. Thermal resistance junction to ambient versus copper surface under each lead (SMA)

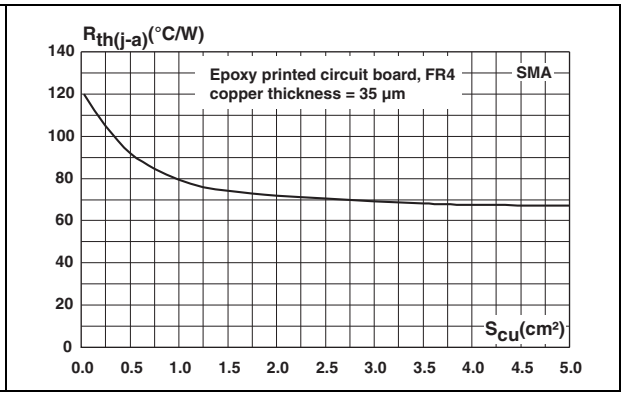
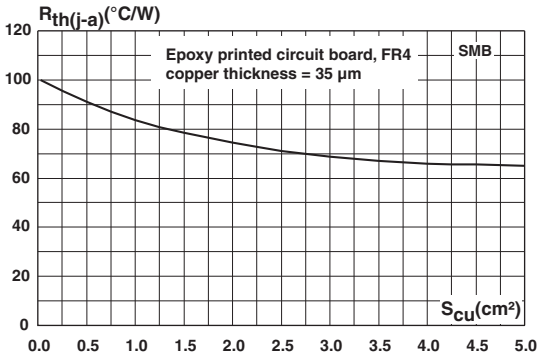


Figure 15. Thermal resistance junction to ambient versus copper surface under each lead (SMB)

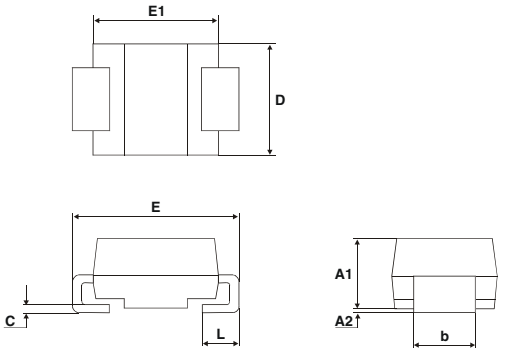


2 Package information

- 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)

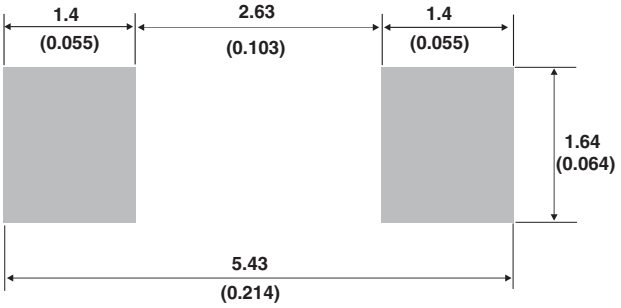
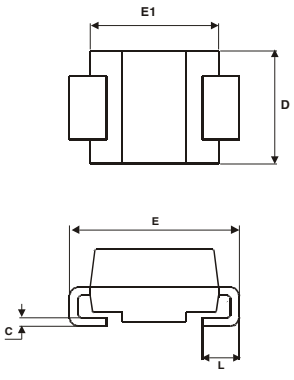
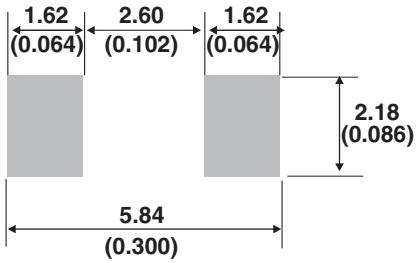


Table 6. SMB dimensions



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.

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