STPS140-Y

Automotive power Schottky rectifier

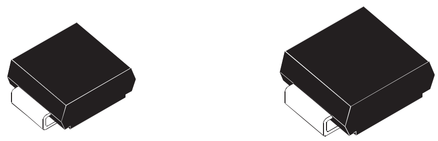
Features

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

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 for automotive applications.



SMA (JEDEC DO-214AC) STPS140AY

SMB (JEDEC DO-214AA) STPS140UY

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	1 A
V_{RRM}	40 V
$T_{j\ (max)}$	150 °C
$V_{F\ (max)}$	0.5 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 voltage			7	A
$I_{F(AV)}$	Average forward current	SMA	T_L = 130 °C δ = 0.5	1	A
		SMB	T_L = 135 °C δ = 0.5		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 Tj = 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	Test Conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$			12	µA
		T_j = 100 °C			0.25	2	mA
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 1 A			0.55	V
		T_j = 125 °C			0.43	0.5	
		T_j = 25 °C	I_F = 2 A			0.65	
		T_j = 125 °C			0.53	0.6	

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

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

Figure 1. Average forward power dissipation versus average forward current

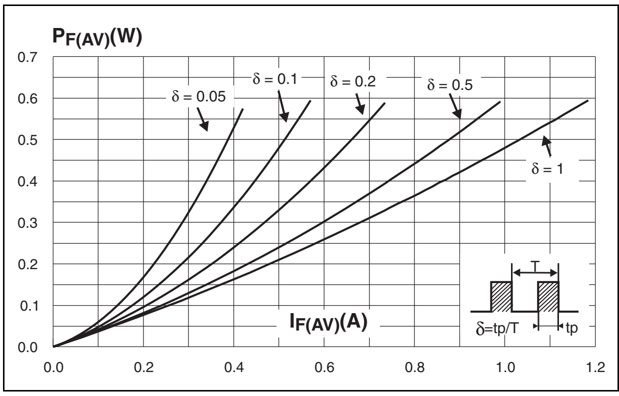


Figure 2. Average forward current versus ambient temperature (δ = 0.5)

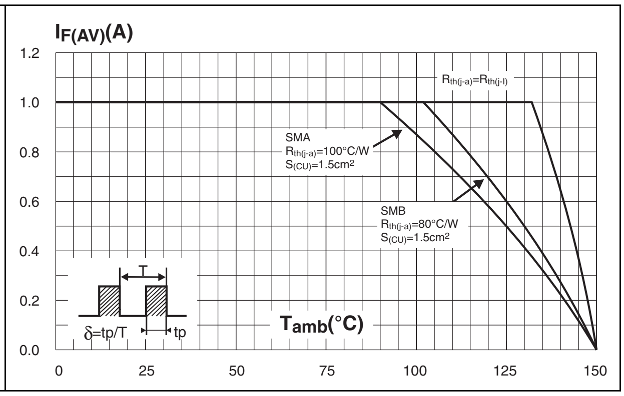


Figure 3. Normalized avalanche power derating versus pulse duration

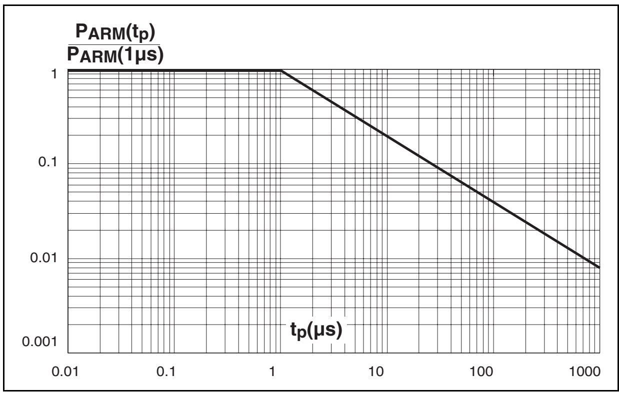


Figure 4. Normalized avalanche power derating versus junction temperature

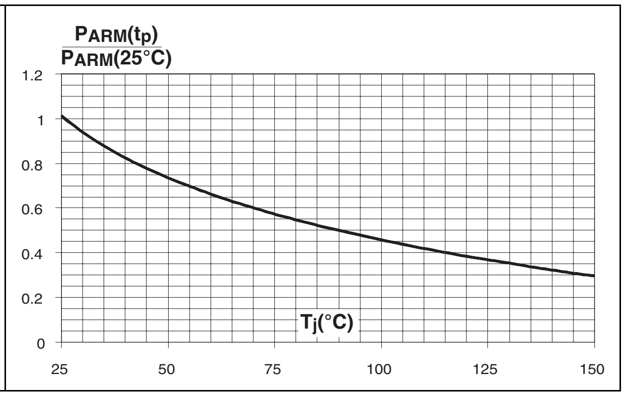


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values) (SMA)

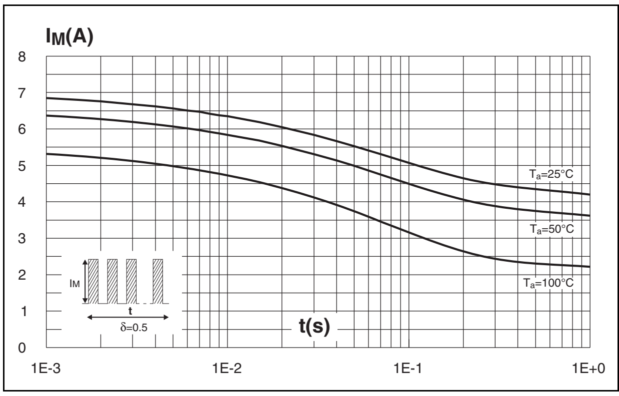


Figure 6. Non repetitive surge peak forward current versus overload duration (maximum values) (SMB)

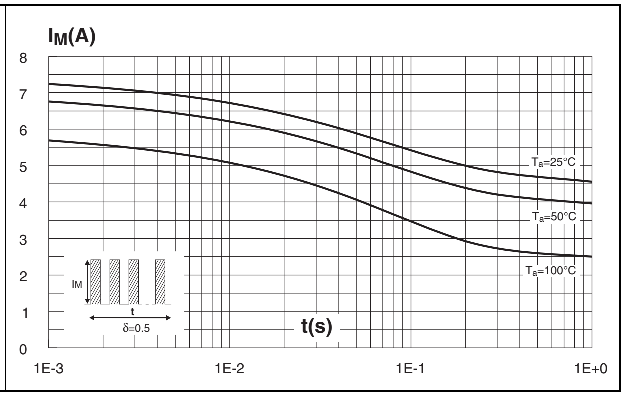


Figure 7. Relative variation of thermal impedance junction to ambient versus pulse duration (SMA)

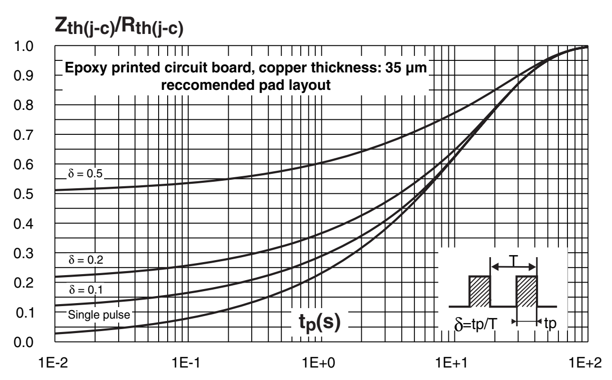


Figure 8. Relative variation of thermal impedance junction to ambient versus pulse duration (SMB)

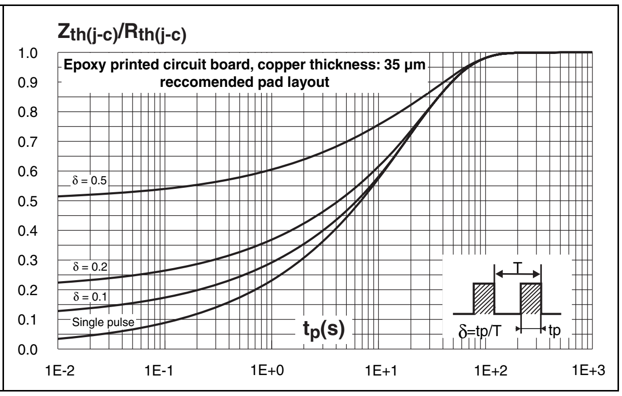


Figure 9. Reverse leakage current versus reverse voltage applied (typical values)

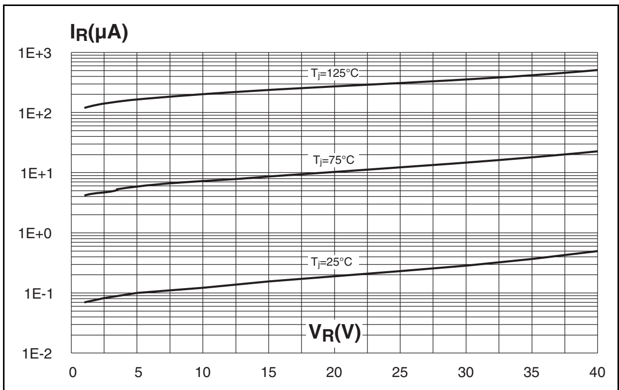


Figure 10. Junction capacitance versus reverse voltage applied (typical values)

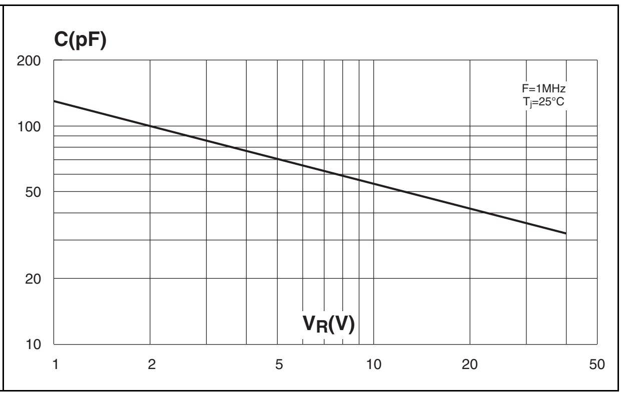


Figure 11. Forward voltage drop versus forward current (maximum values)

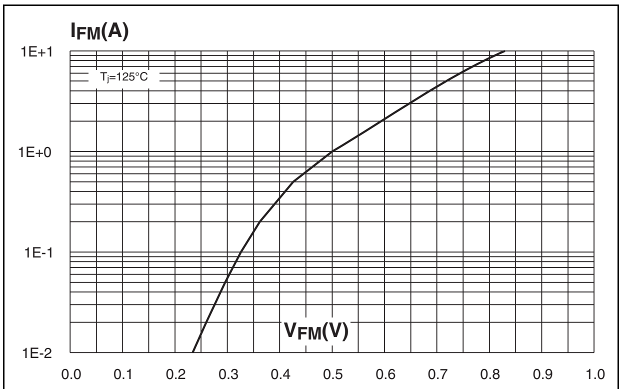


Figure 12. Thermal resistance junction to ambient versus copper surface under each lead (SMA)

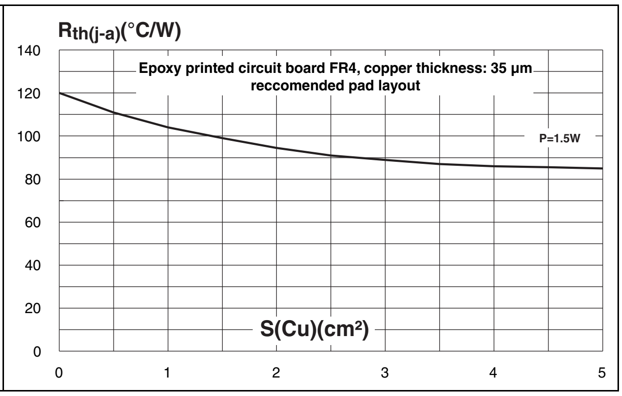
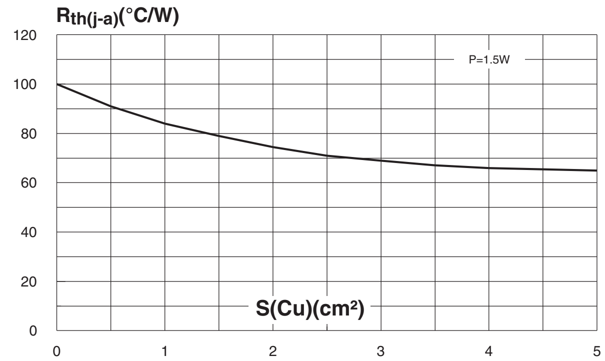


Figure 13. Thermal resistance junction to ambient versus copper surface under each lead (Epoxy printed circuit board FR4, copper thickness: 35 µm) (SMB)

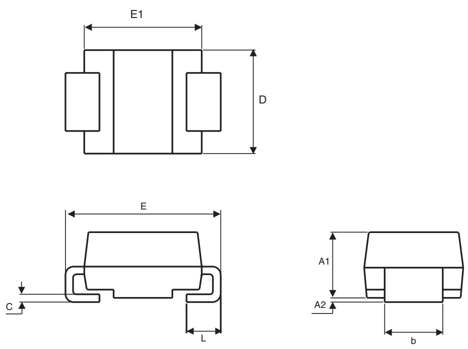


2 Package information

- Band indicates cathode
- Epoxy meets UL94, V0

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 mechanical data



Ref	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.03	0.075	0.080
A2	0.05	0.20	0.002	0.008
b	1.25	1.65	0.049	0.065
c	0.15	0.41	0.006	0.016
E	4.80	5.60	0.189	0.220
E1	3.95	4.60	0.156	0.181
D	2.25	2.95	0.089	0.116
L	0.75	1.60	0.030	0.063

Figure 15. SMA footprint dimensions (in millimeters)

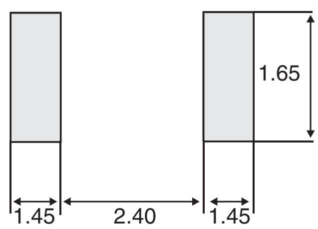
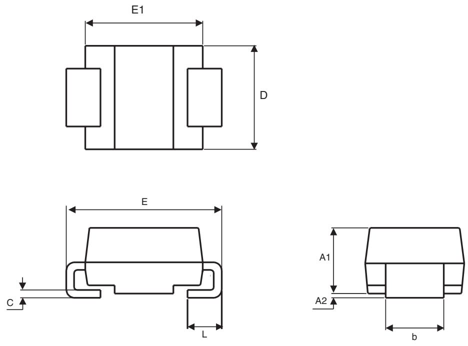
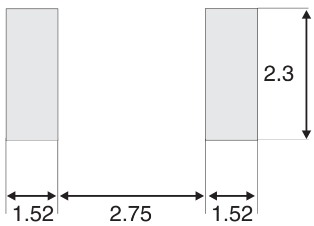


Figure 16. SMB package mechanical data



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	0.41	0.006	0.016
E	5.10	5.60	0.201	0.220
E1	4.05	4.60	0.159	0.181
D	3.30	3.95	0.130	0.156
L	0.75	1.60	0.030	0.063

Figure 17. SMB footprint dimensions (in millimeters)



3 Ordering information

Table 5. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS140A	S140Y	SMA	0.068 g	5000	Tape and reel
STPS140U	G14Y	SMB	0.107 g	2500	Tape and reel

4 Revision history

Table 6. Document revision history

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