

Low drop power Schottky rectifier

Features

- Very small conduction losses
- Negligible switching losses
- Low forward voltage drop
- Surface mount miniature package
- Avalanche capability specified
- ECOPACK2[®] halogen-free component (SMAflat and SMBflat)

Description

Single chip Schottky rectifiers suited to Switched Mode Power Supplies and high frequency DC to DC converters.

Packaged in SMB, low profile SMB and low profile SMA, this device is especially intended for surface mounting and used in low voltage, high frequency inverters, free wheeling and polarity protection applications.

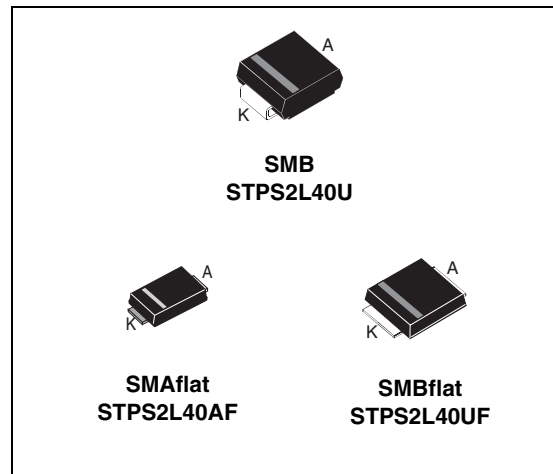


Table 1. Device summary

$I_{F(AV)}$	2 A
V_{RRM}	40 V
$T_j(\text{max})$	150 °C
$V_F(\text{max})$	0.34 V

1 Characteristics

Table 2. Absolute ratings (limiting values)

Symbol	Parameter		Value	Unit	
V_{RRM}	Repetitive peak reverse voltage		40	V	
$I_{F(AV)}$	Average forward current	SMB	$T_L = 130\text{ °C } \delta = 0.5$	2	A
		SMBflat	$T_L = 140\text{ °C } \delta = 0.5$		
		SMAflat	$T_L = 130\text{ °C } \delta = 0.5$		
I_{FSM}	Surge non repetitive forward current	$t_p = 10\text{ ms sinusoidal}$	75	A	
P_{ARM}	Repetitive peak avalanche power	$t_p = 1\text{ }\mu\text{s } T_j = 25\text{ °C}$	2200	W	
T_{stg}	Storage temperature range		-65 to + 150	°C	
T_j	Operating junction temperature ⁽¹⁾		150	°C	

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 resistances

Symbol	Parameter		Value	Unit
$R_{th(j-l)}$	Junction to lead	SMB	20	°C/W
		SMBflat	10	
		SMAflat	20	

Table 4. Static electrical characteristics

Symbol	Tests conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = 40\text{ V}$		220	μA
		$T_j = 100\text{ °C}$			20	mA
		$T_j = 125\text{ °C}$		38	80	mA
$V_F^{(1)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 1\text{ A}$		0.39	V
		$T_j = 125\text{ °C}$		0.25	0.28	
		$T_j = 25\text{ °C}$	$I_F = 2\text{ A}$		0.43	V
		$T_j = 125\text{ °C}$		0.31	0.34	
		$T_j = 25\text{ °C}$	$I_F = 4\text{ A}$		0.5	V
		$T_j = 125\text{ °C}$		0.39	0.45	

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

To evaluate the conduction losses use the following equation:

$$P = 0.22 \times I_{F(AV)} + 0.06 I_{F(RMS)}^2$$

Figure 1. Average forward power dissipation versus average forward current

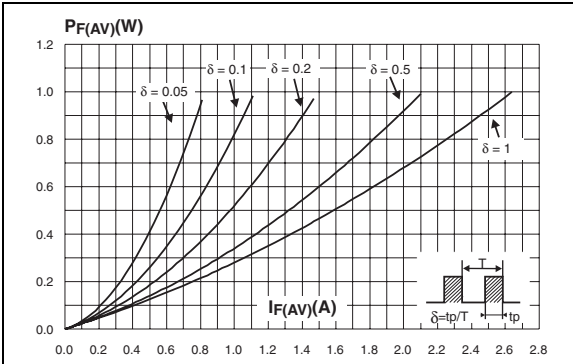


Figure 2. Average forward current versus ambient temperature (delta = 0.5) SMB

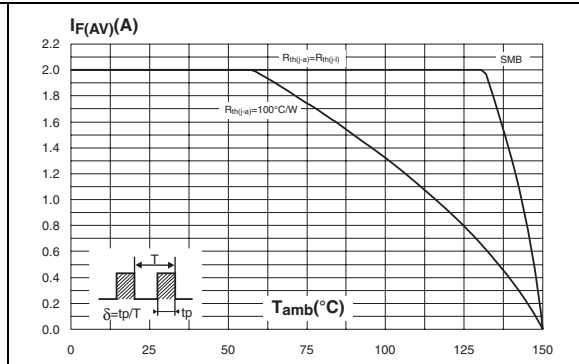


Figure 3. Average forward current versus ambient temperature (delta = 0.5) SMBflat

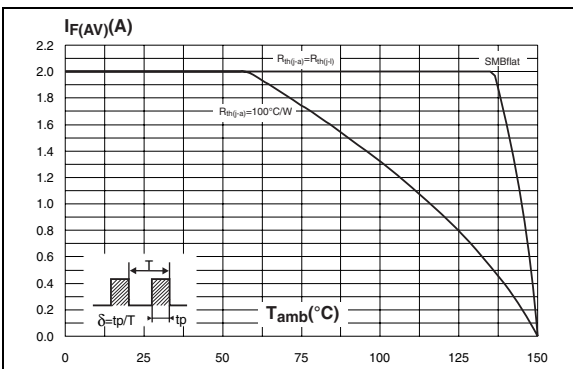


Figure 4. Average forward current versus ambient temperature (delta = 0.5) SMAflat

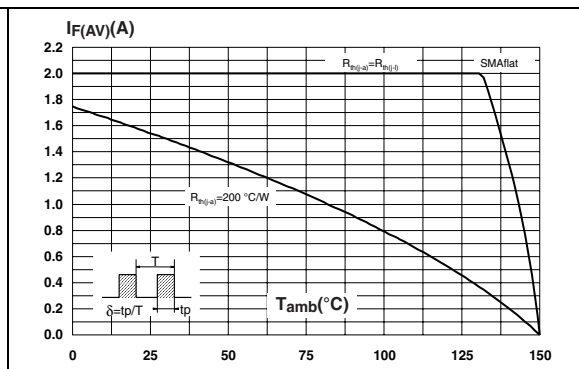


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values) SMB

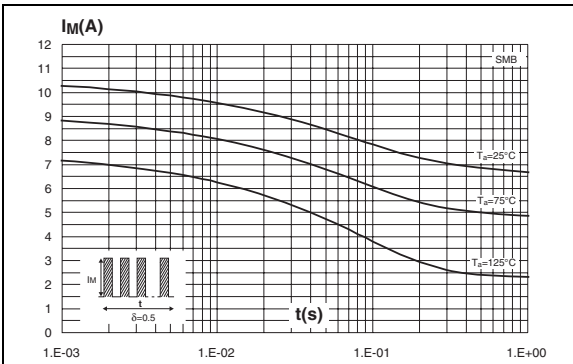


Figure 6. Non repetitive surge peak forward current versus overload duration (maximum values) SMBflat

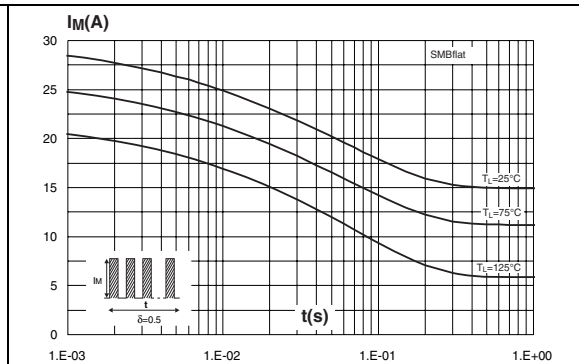


Figure 7. Non repetitive surge peak forward current versus overload duration (maximum values) SMAflat

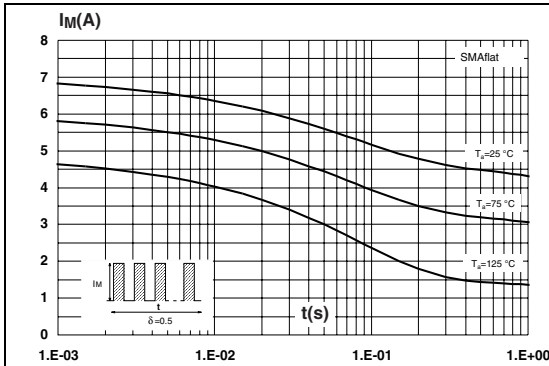


Figure 8. Normalized avalanche power derating versus pulse duration

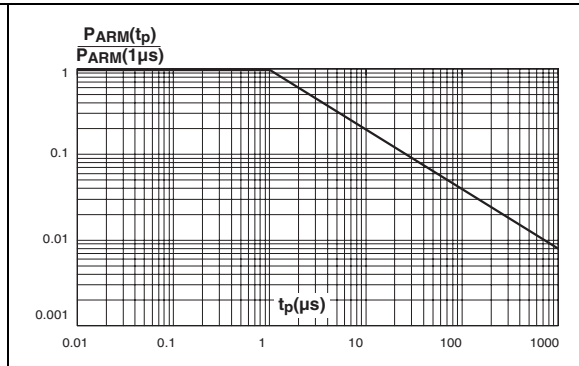


Figure 9. Normalized avalanche power derating versus junction temperature

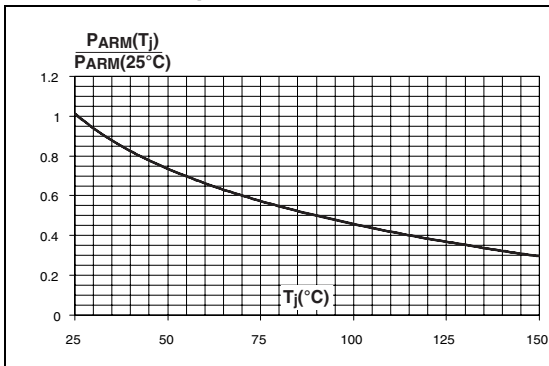


Figure 10. Relative variation of thermal impedance junction to ambient versus pulse duration - SMB

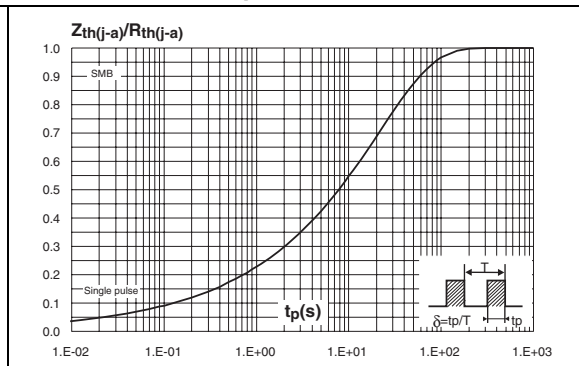


Figure 11. Relative variation of thermal impedance junction to lead versus pulse duration - SMBflat

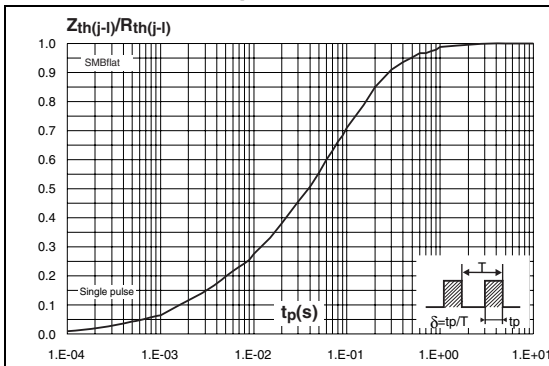


Figure 12. Relative variation of thermal impedance junction to ambient versus pulse duration - SMAflat

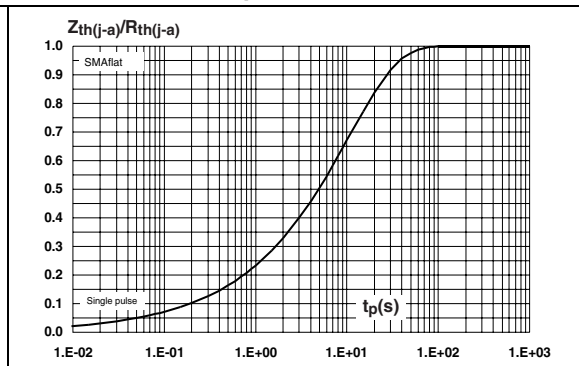


Figure 13. Reverse leakage current versus reverse voltage applied (typical values)

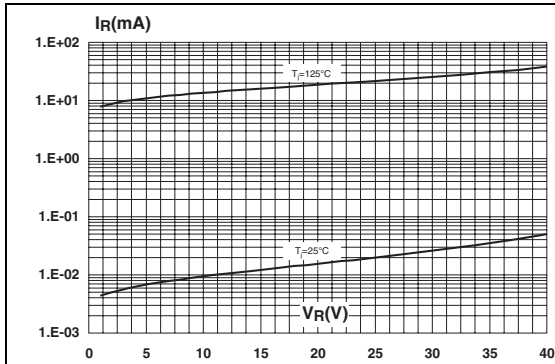


Figure 14. Junction capacitance versus reverse voltage applied (typical values)

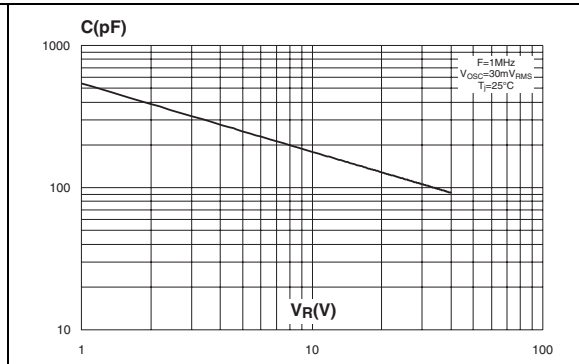


Figure 15. Forward voltage drop versus forward current (high level)

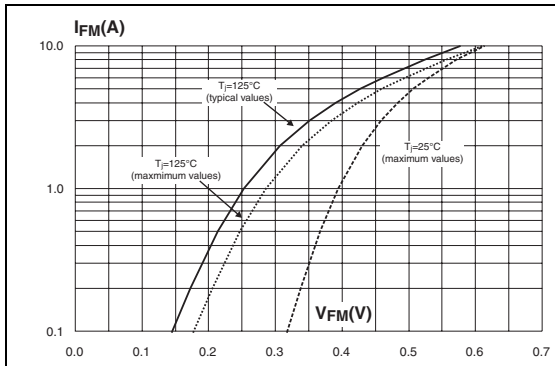


Figure 16. Forward voltage drop versus forward current (low level)

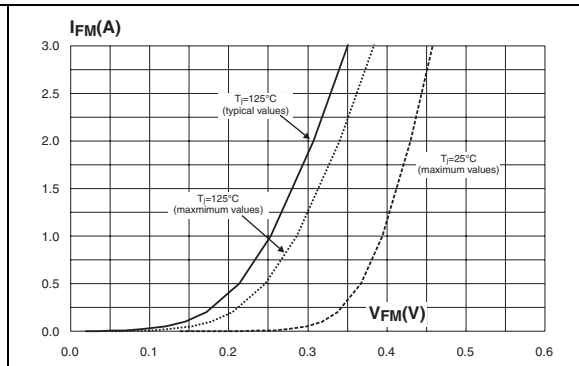


Figure 17. Thermal resistance junction to ambient versus copper surface under each lead, SMB, SMBflat (epoxy printed board FR4, copper thickness = 35 μm)

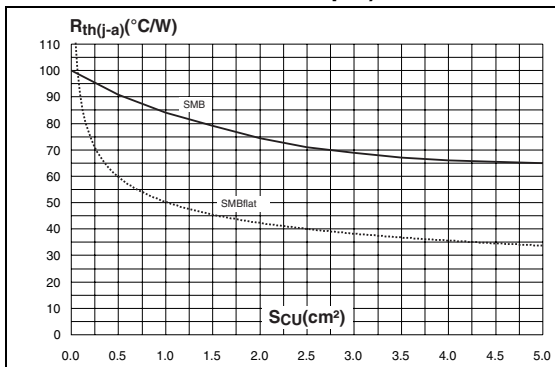
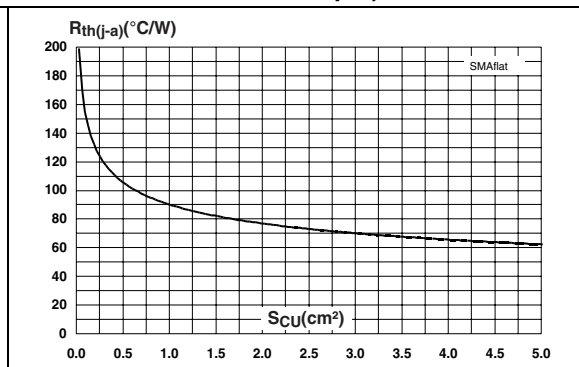


Figure 18. Thermal resistance junction to ambient versus copper surface under each lead, SMAflat (epoxy printed board FR4, copper thickness = 35 μm)



2 Package Information

- Epoxy meets UL94,V0

In order to meet environmental requirements, ST offers these devices in ECOPACK[®] packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at www.st.com.

Table 5. 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
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	1.50	0.030	0.059

Figure 19. SMB footprint dimensions in millimeters (inches)

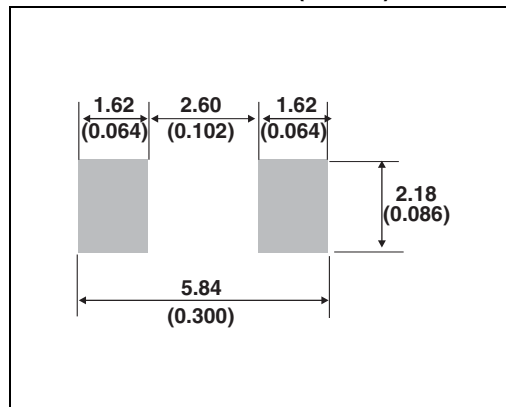


Figure 20. Marking information

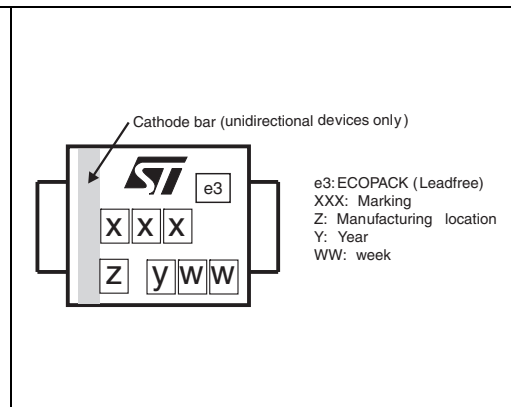
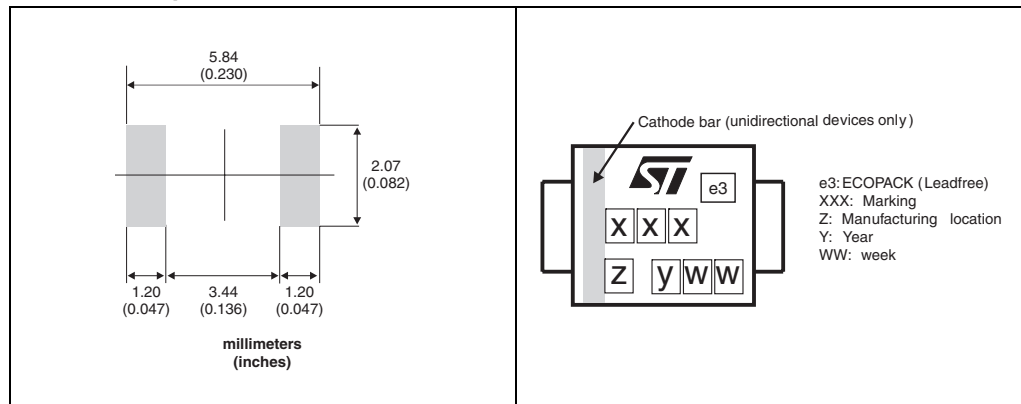


Table 6. SMBflat dimensions

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.90		1.10	0.035		0.043
b ⁽¹⁾	1.95		2.20	0.077		0.087
c ⁽¹⁾	0.15		0.40	0.006		0.016
D	3.30		3.95	0.130		0.156
E	5.10		5.60	0.200		0.220
E1	4.05		4.60	0.189		0.181
L	0.75		1.50	0.029		0.059
L1		0.40			0.016	
L2		0.60			0.024	

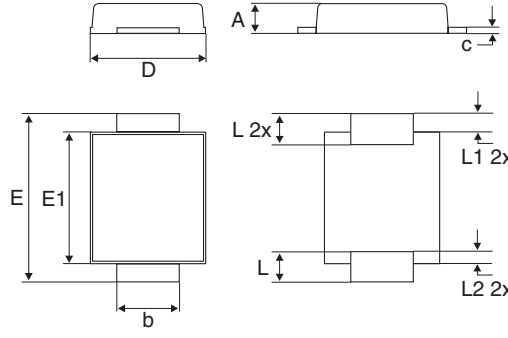
1. Applies to plated leads

Figure 21. SMBflat footprint dimensions **Figure 22. Marking information optimized for SMBflat⁽¹⁾**



1. SMB footprint may also be used.

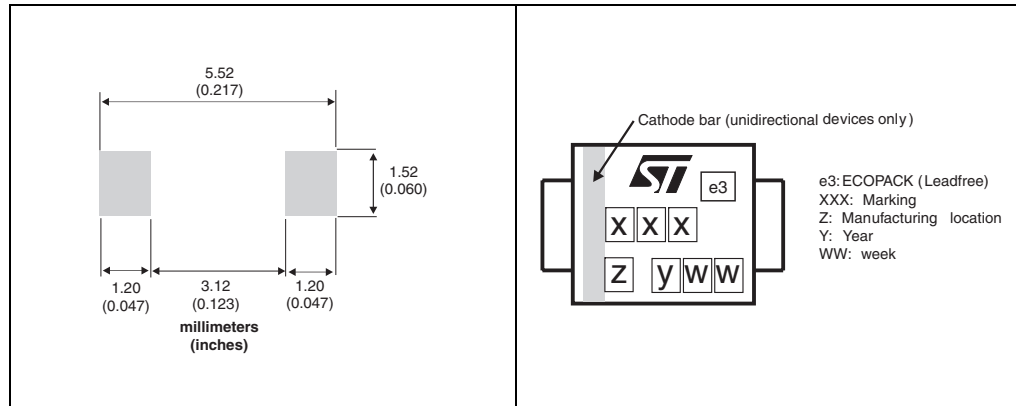
Table 7. SMAflat dimensions



The diagram shows three views of the SMAflat footprint: a top view, a side view, and a perspective view. Dimensions are labeled as follows: A (height of the top pad), b (width of the bottom pad), c (height of the bottom pad), D (width of the top pad), E (total height), E1 (height of the top pad), L (height of the bottom pad), L1 (height of the top pad), L2 (height of the bottom pad), and L 2x (height of the top pad).

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.90		1.10	0.035		0.043
b	1.25		1.65	0.049		0.065
c	0.15		0.40	0.006		0.016
D	2.25		2.95	0.088		0.116
E	4.80		5.60	0.189		0.220
E1	3.95		4.60	0.156		0.181
L	0.75		1.50	0.030		0.059
L1		0.50			0.019	
L2		0.50			0.019	

Figure 23. SMAflat footprint dimensions Figure 24. Marking information optimized for SMAflat⁽¹⁾



1. SMA footprint may also be used.

3 Ordering Information

Table 8. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS2L40U	GD4	SMB	0.107 g	2500	Tape and reel
STPS2L40UF	FGD4	SMBflat	0.50 g	5000	Tape and reel
STPS2L40AF	F2L4	SMAflat	0.35 g	10000	Tape and reel

4 Revision history

Table 9. Document revision history

Date	Revision	Description of changes
Jul-2003	2A	Last update.
31-Jan-2007	3	Reformatted to current standard. Added ECOPACK statement. Added SMBflat package.
18-Sep-2008	4	Reformatted to current standard. Updated ECOPACK statement. Added SMAflat package.

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