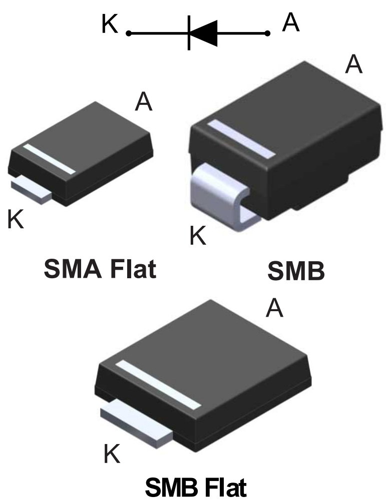
STPS2L40

Datasheet

40 V - 2 A power Schottky rectifier



Features

- Very small conduction losses
- Negligible switching losses
- Low forward voltage drop
- Surface mount miniature package
- Avalanche rated
- ECOPACK®2 component

Applications

- Telecom power supply
- Set-top box power supply
- TV power supply
- Battery charger

Description

Single chip Schottky rectifiers designed for high frequency miniature switched mode power supplies such as adaptors and on board DC/DC converters.

Packaged in SMB, SMA Flat and SMB Flat, the STPS2L40 is ideal for surface mounting and used in low voltage, high frequency inverters, free wheeling and polarity protection applications.

Product status
STPS2L40

Product summary	
Symbol	**Value**
$I_{F(AV)}$	2 A
V_{RRM}	40 V
$T_{j(max.)}$	150 °C
$V_{F(typ.)}$	0.31 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			40	V
$I_{F(AV)}$	Average forward current, δ = 0.5, square wave	SMB	T_L = 130 °C	2	A
		SMB Flat	T_L = 140 °C		
		SMA Flat	T_L = 130 °C		
I_{FSM}	Surge non repetitive forward current		t_p = 10 ms sinusoidal	75	A
P_{ARM}	Repetitive peak avalanche power		t_p = 10 µs, T_j = 125 °C	158	W
T_{stg}	Storage temperature range			-65 to +150	°C
T_j	Maximum operating junction temperature(1)			+150	°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 resistance parameter

Symbol	Parameter		Max. value	Unit
$R_{th(j-l)}$	Junction to lead	SMB	20	°C/W
		SMB Flat	10	
		SMA Flat	20	

For more information, please refer to the following application note :

- AN5088 : Rectifiers thermal management, handling and mounting recommendations

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 = 40 V	-		220	µA
		T_j = 100 °C		-		20	mA
		T_j = 125 °C		-	38	80	mA
V_F(1)	Forward voltage drop	T_j = 25 °C	I_F = 1 A	-		0.39	V
		T_j = 125 °C		-	0.25	0.28	
		T_j = 25 °C	I_F = 2 A	-		0.43	
		T_j = 125 °C		-	0.31	0.34	
		T_j = 25 °C	I_F = 4 A	-		0.50	
		T_j = 125 °C		-	0.39	0.45	

1. *Pulse test: t_p = 380 µs, δ < 2%*

To evaluate the conduction losses, use the following equation:

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

For more information, please refer to the following application notes related to the power losses :

- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

1.1 Characteristics (curves)

Figure 1. Average forward power dissipation versus average forward current

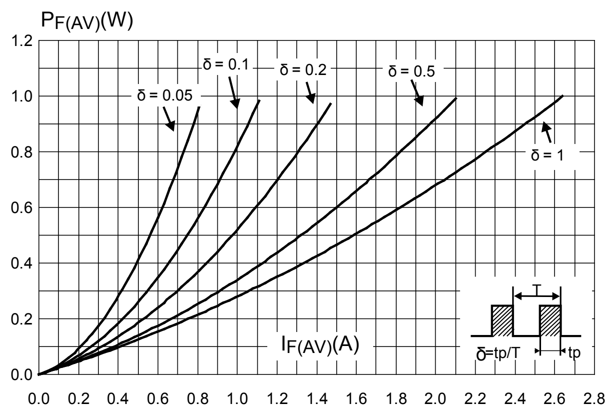


Figure 2. Average forward current versus ambient temperature (δ = 0.5) SMB

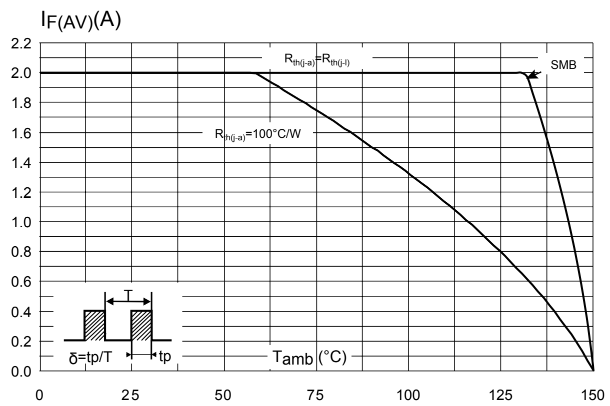


Figure 3. Average forward current versus ambient temperature (δ = 0.5, SMB Flat)

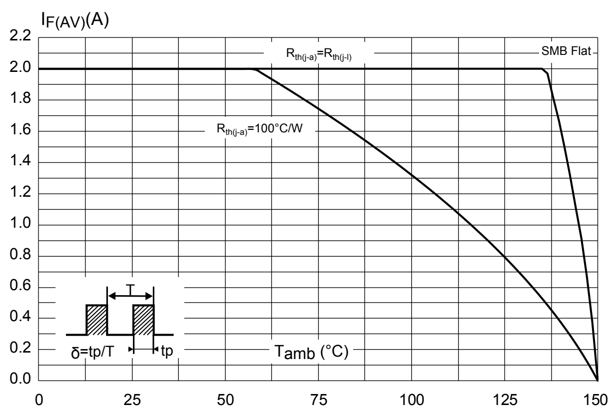


Figure 4. Average forward current versus ambient temperature (δ = 0.5, SMA Flat)

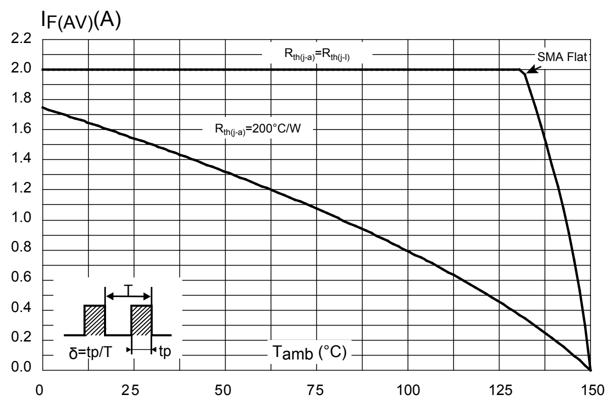


Figure 5. Normalized avalanche power derating versus pulse duration (T_j = 125 °C)

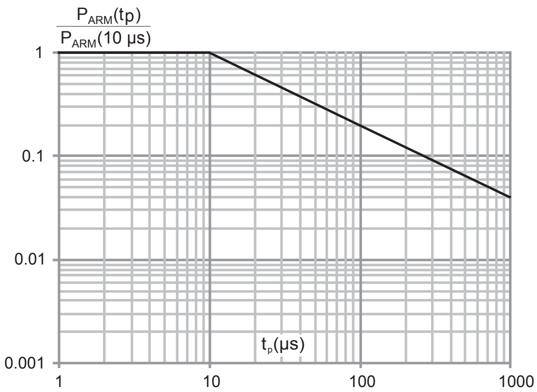


Figure 6. Relative variation of thermal impedance junction to ambient versus pulse duration (SMB)

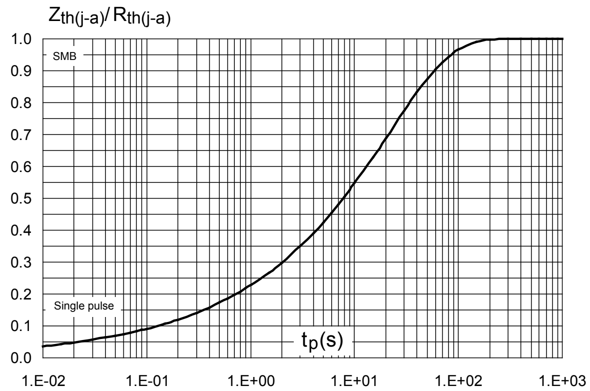


Figure 7. Relative variation of thermal impedance junction to lead versus pulse duration (SMB flat)

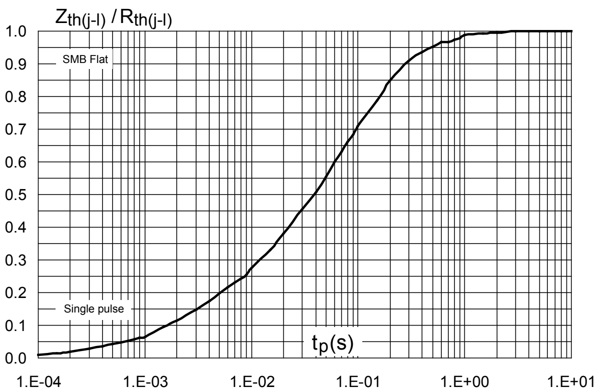


Figure 8. Relative variation of thermal impedance junction to ambient versus pulse duration (SMA Flat)

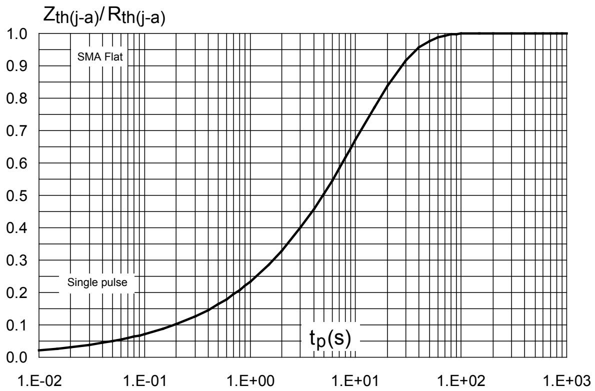


Figure 9. Reverse leakage current versus reverse voltage applied (typical values)

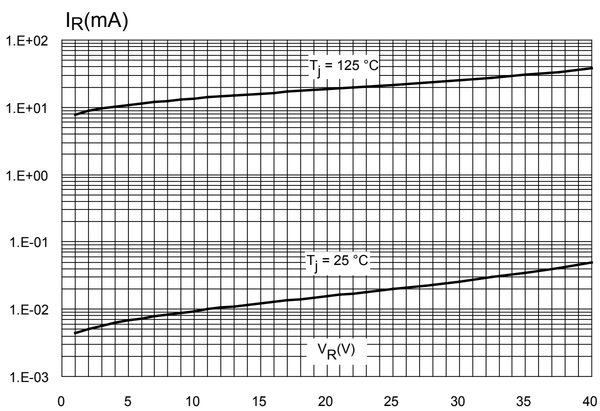


Figure 10. Junction capacitance versus reverse voltage applied (typical values)

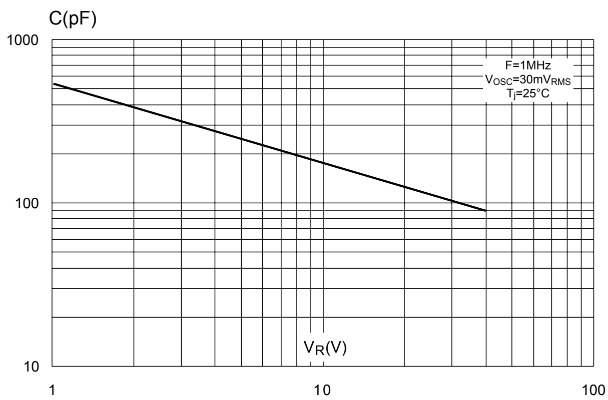


Figure 11. Forward voltage drop versus forward current (high level)

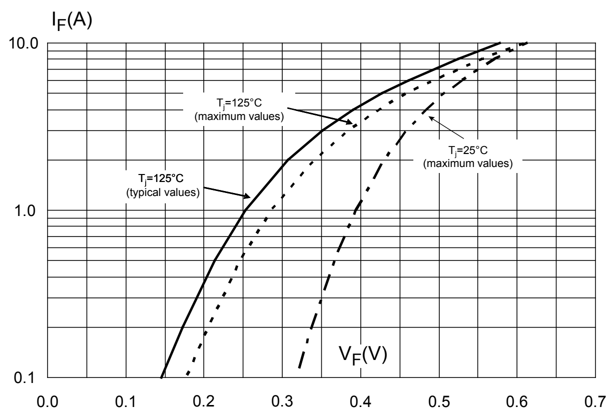


Figure 12. Forward voltage drop versus forward current (low level)

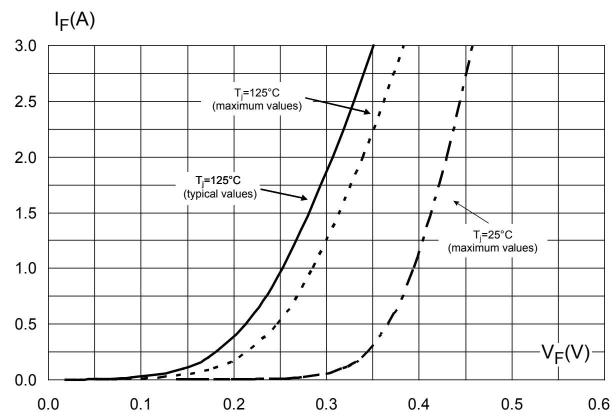


Figure 13. Thermal resistance junction to ambient versus copper surface under each lead (SMB)

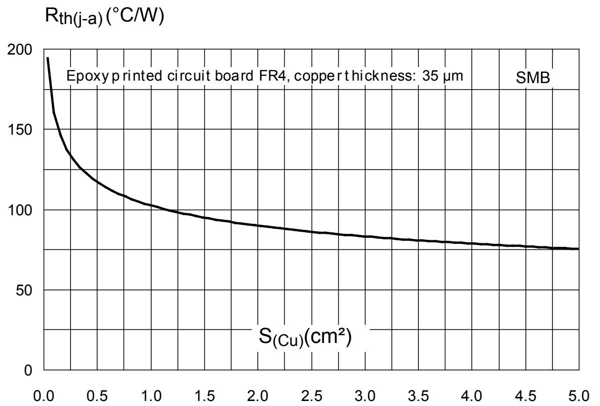


Figure 14. Thermal resistance junction to ambient versus copper surface under each lead (SMB flat)

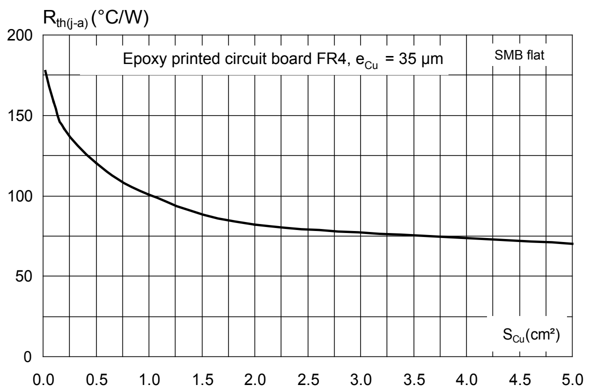
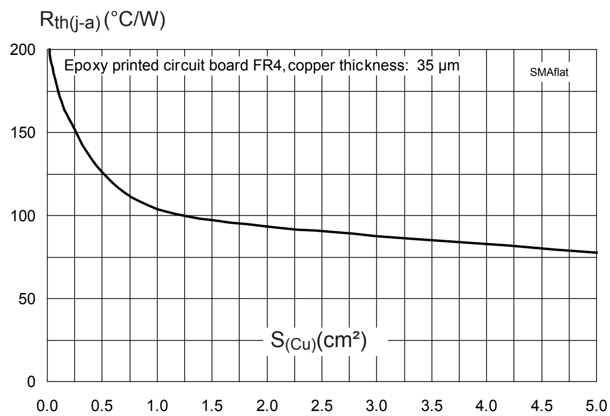


Figure 15. Thermal resistance junction to ambient versus copper surface under each lead (SMA Flat)



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 16. SMB package outline

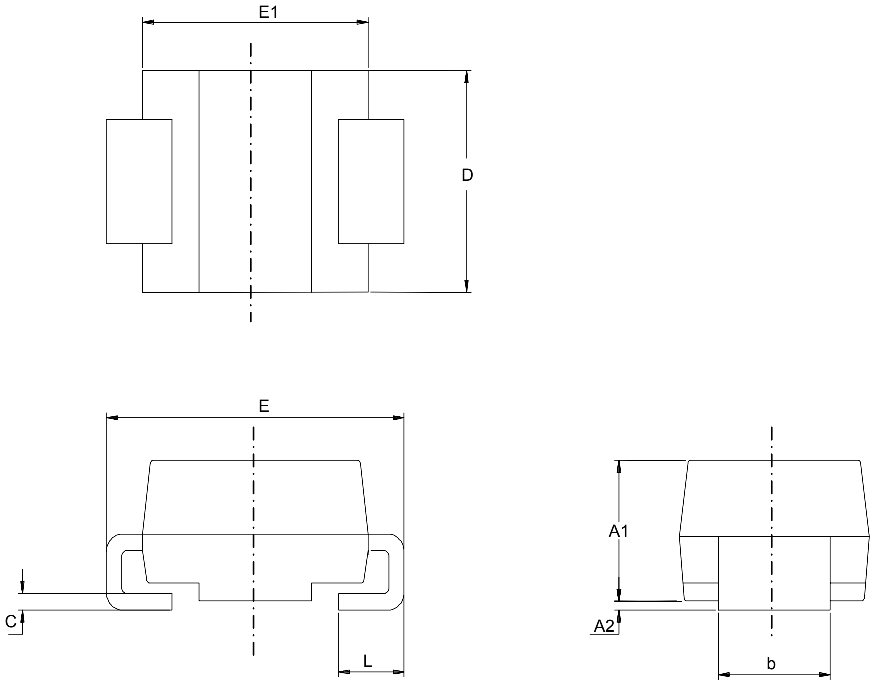
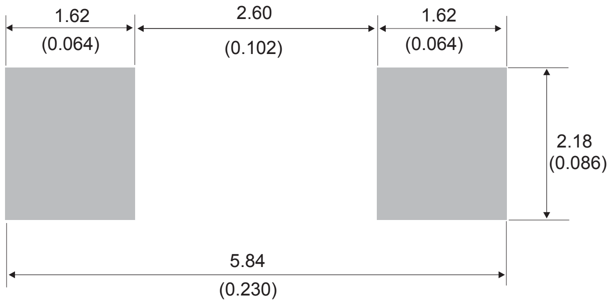


Table 4. SMB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.074	0.097
A2	0.05	0.20	0.001	0.008
b	1.95	2.20	0.076	0.087
c	0.15	0.40	0.005	0.016
D	3.30	3.95	0.129	0.156
E	5.10	5.60	0.200	0.221
E1	4.05	4.60	0.159	0.182
L	0.75	1.50	0.029	0.060

Figure 17. SMB recommended footprint



2.2 SMB Flat package information

- Epoxy meets UL94, V0
- Lead-free package

Figure 18. **SMB Flat package outline**

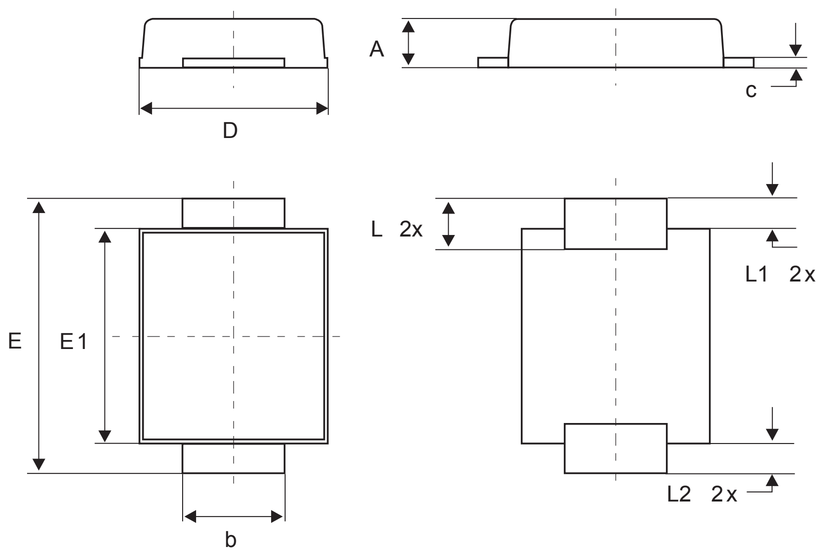
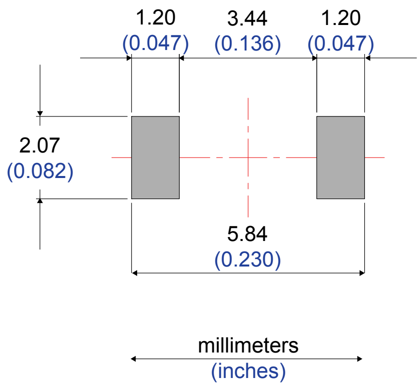


Table 5. **SMB Flat mechanical data**

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.90		1.10	0.035		0.044
b	1.95		2.20	0.076		0.087
c	0.15		0.40	0.005		0.016
D	3.30		3.95	0.129		0.156
E	5.10		5.60	0.200		0.221
E1	4.05		4.60	0.159		0.182
L	0.75		1.50	0.029		0.060
L1		0.40			0.016	
L2		0.60			0.024	

Figure 19. Footprint recommendations, dimensions in mm (inches)



2.3 SMA Flat package information

- Epoxy meets UL94, V0
- Lead-free package

Figure 20. **SMA Flat package outline**

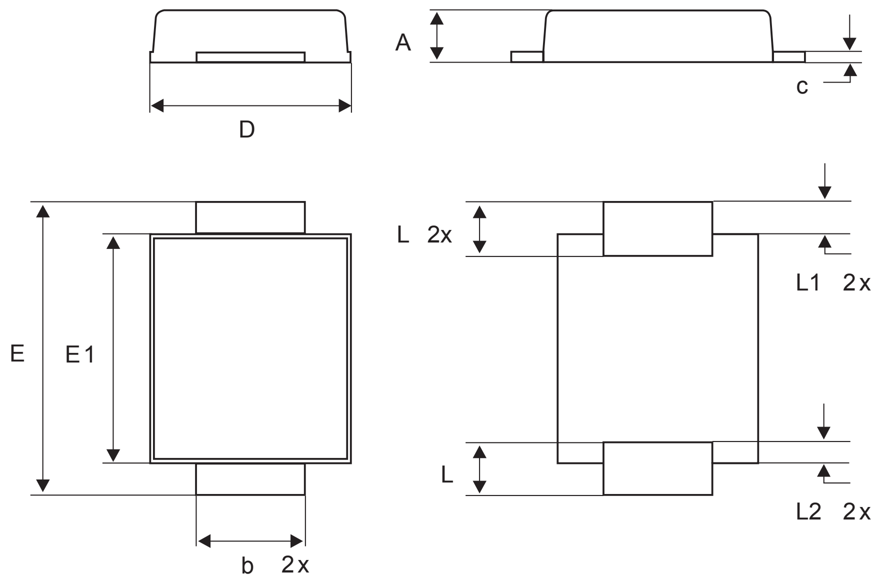
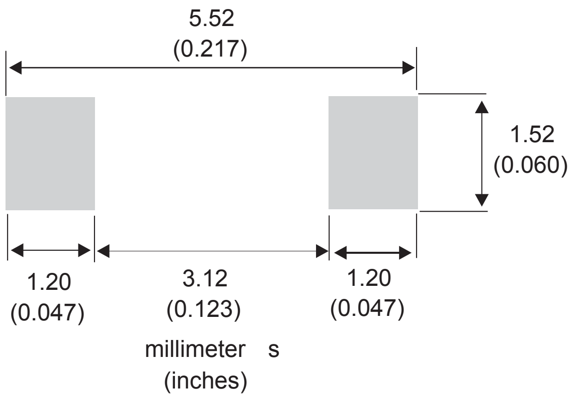


Table 6. **SMA Flat package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches (for reference only)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.90		1.10	0.035		0.044
b	1.25		1.65	0.049		0.065
c	0.15		0.40	0.005		0.016
D	2.25		2.95	0.088		0.117
E	4.80		5.60	0.188		0.221
E1	3.95		4.60	0.155		0.182
L	0.75		1.50	0.029		0.060
L1		0.50			0.020	
L2		0.50			0.020	

Figure 21. SMA Flat recommended footprint in mm (inches)



3 Ordering information

Table 7. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS2L40U	GD4	SMB	0.107 g	2500	Tape and reel
STPS2L40UF	FGD4	SMB Flat	0.050 g	5000	Tape and reel
STPS2L40AF	F2L4	SMA Flat	0.035 g	10000	Tape and reel

Revision history

Table 8. **Document revision history**

Date	Version	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.
04-Dec-2018	5	Updated Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified) and Figure 5. Normalized avalanche power derating versus pulse duration (T_j = 125 °C).