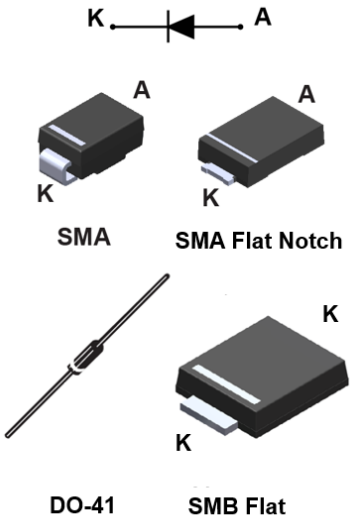
STPS2L60

Datasheet

60 V, 2 A low drop power Schottky rectifier



Features

- Negligible switching losses
- Low forward voltage drop for higher efficiency and extended battery life
- Surface mount miniature package
- Avalanche rated
- ECOPACK2 compliant component

Applications

- Lighting
- Desktop power supply
- Battery charger
- Set top box
- Auxiliary power

Description

This 60 V power Schottky rectifier is ideal for switch mode power supplies and high frequency converters.

Packaged in SMA, SMA Flat Notch, axial and SMB Flat, the STPS2L60 is optimized for use in low voltage, high frequency inverters and small battery chargers.

Product status
STPS2L60

Product summary	
Symbol	**Values**
$I_{F(AV)}$	2 A
V_{RRM}	60 V
$T_{j\ (max.)}$	150 °C
$V_{F(typ.)}$	0.51 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			60	V
$I_{F(RMS)}$	Forward rms current			10	A
$I_{F(AV)}$	Average forward current δ = 0.5, square wave	SMB Flat	T_L = 130 °C	2	A
		SMA	T_L = 115 °C		
		SMA Flat Notch	T_L = 120 °C		
		DO-41	T_L = 110 °C		
I_{FSM}	Surge non repetitive forward current	SMB Flat, SMA, DO-41	t_p = 10 ms sinusoidal	75	A
		SMA Flat Notch		105	
P_{ARM}	Repetitive peak avalanche power	t_p = 10 µs, T_j= 125 °C		115	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 Flat	15	°C/W
			SMA	25	
			SMA Flat Notch	20	
	Junction to lead	Lead length = 10 mm	DO-41	30	

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	$V_R = V_{RRM}$	-		100	µA
		T_j = 100 °C		-	2	10	mA
V_F (1)	Forward voltage drop	T_j = 25 °C	I_F = 2 A	-		0.60	V
		T_j = 125 °C		-	0.51	0.55	
		T_j = 25 °C	I_F = 4 A	-		0.77	
		T_j = 125 °C		-	0.62	0.67	

1. *Pulse test: t_p = 380 µs, δ < 2%*

To evaluate the conduction losses use the following equation: $P = 0.43 \times I_{F(AV)} + 0.06\ I_F{}^2{}_{(RMS)}$

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

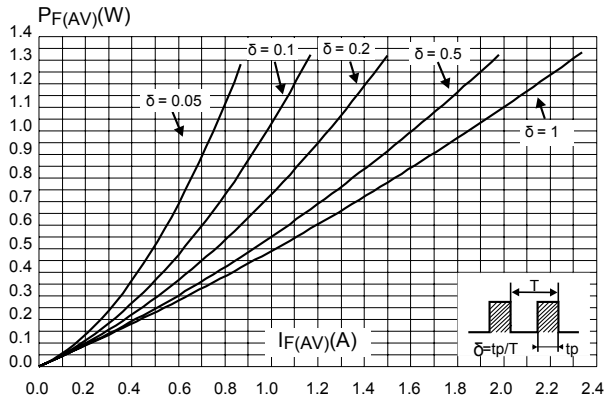


Figure 2. Average forward current versus ambient temperature (δ = 0.5, DO-41, SMA)

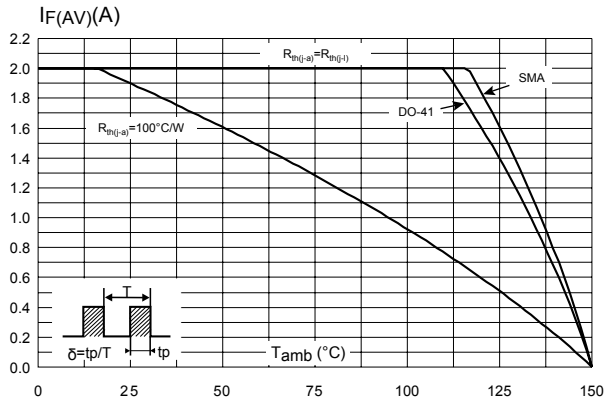


Figure 3. Average forward current versus ambient temperature (δ = 0.5, SMB Flat)

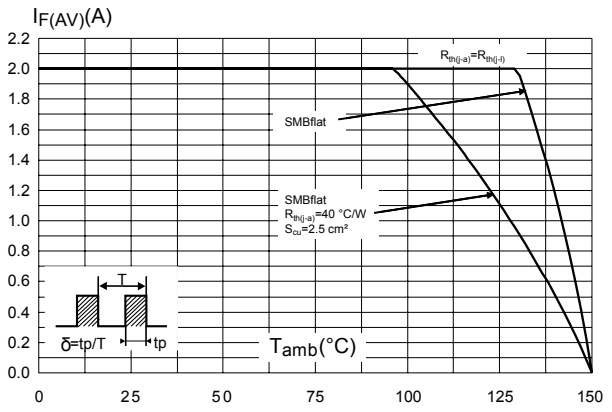


Figure 4. Normalized avalanche power derating versus pulse duration (T_j = 125 °C)

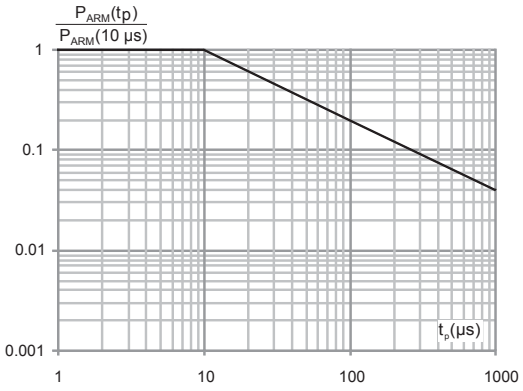


Figure 5. Relative variation of thermal impedance junction to ambient versus pulse duration (SMA)

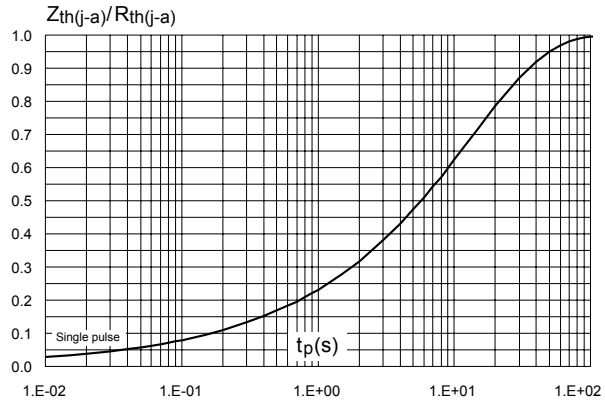


Figure 6. Relative variation of thermal impedance junction to ambient versus pulse duration (DO-41)

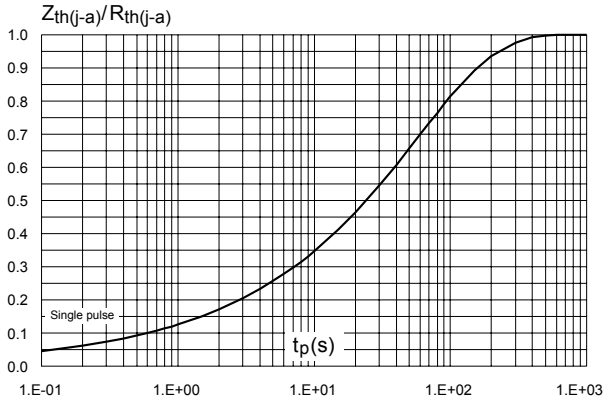


Figure 7. Relative variation of thermal impedance junction to lead versus pulse duration (SMB Flat)

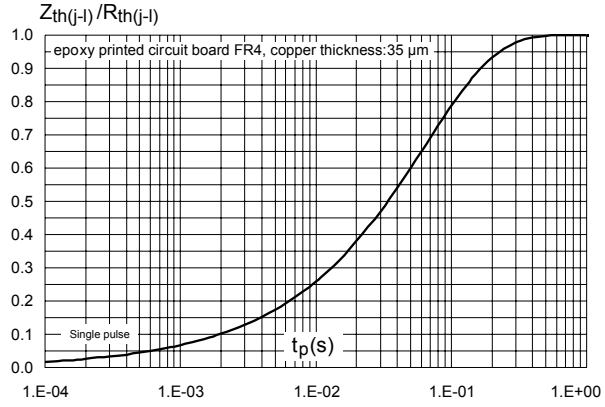


Figure 8. Junction capacitance versus reverse voltage applied (typical values)

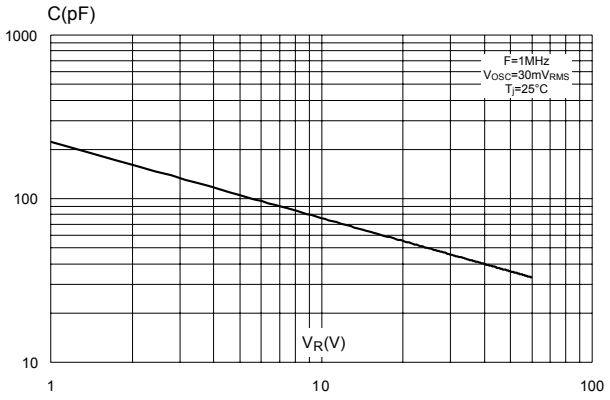


Figure 9. Reverse leakage current versus reverse voltage applied (typical values)

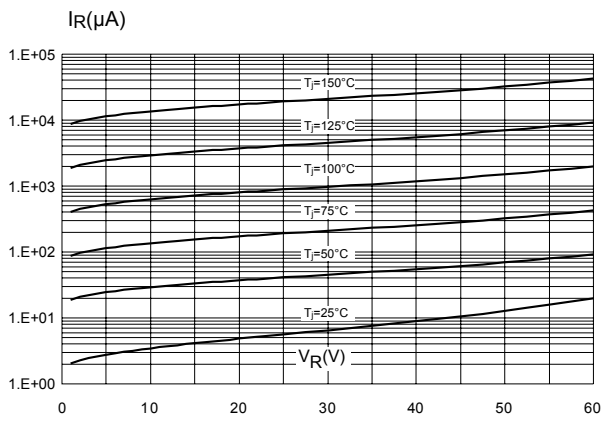


Figure 10. Forward voltage drop versus forward current

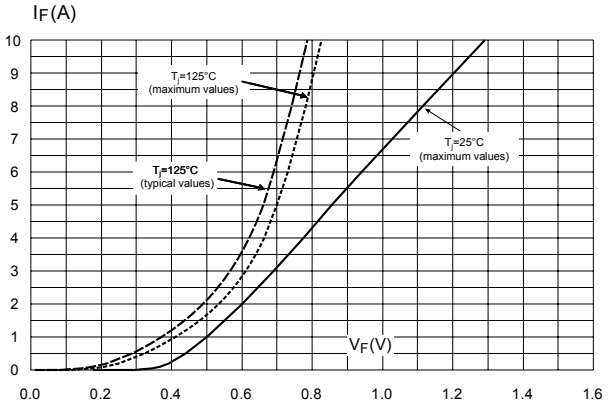


Figure 11. Thermal resistance junction to ambient versus copper surface under each lead (SMA)

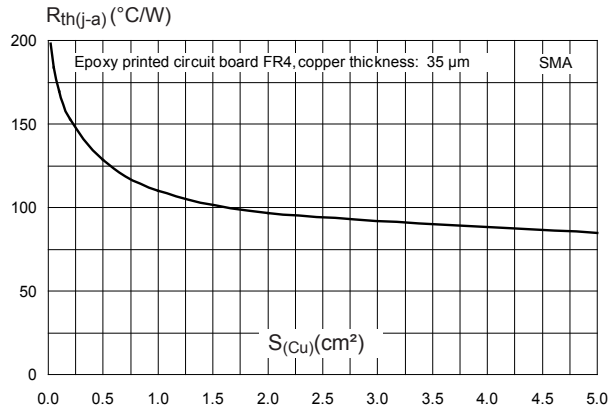


Figure 12. Thermal resistance versus lead length (DO-41)

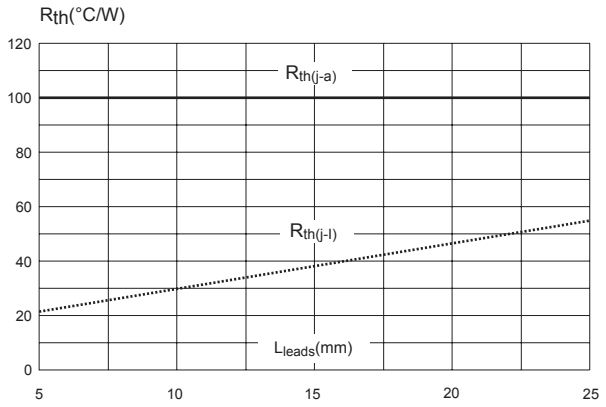


Figure 13. Thermal resistance junction to ambient versus copper surface under each lead (SMB Flat)

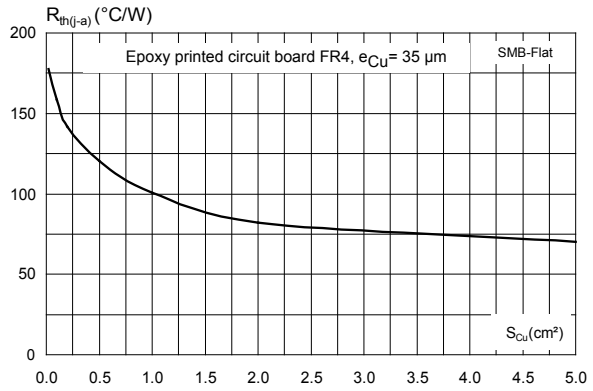
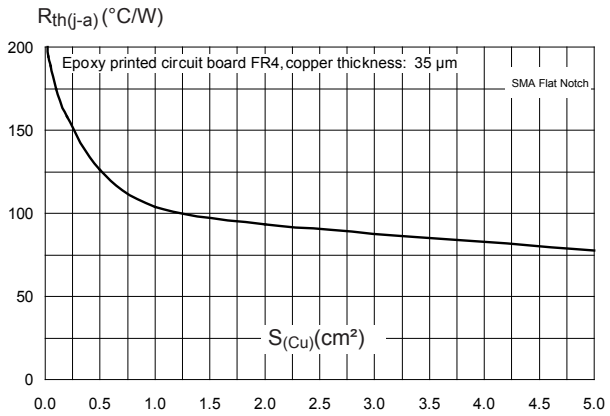


Figure 14. Thermal resistance junction to ambient versus copper surface under each lead (SMA Flat Notch)



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 SMA package information

- Epoxy meets UL94, V0
- Cooling method : by conduction (C)

Figure 15. SMA package outline

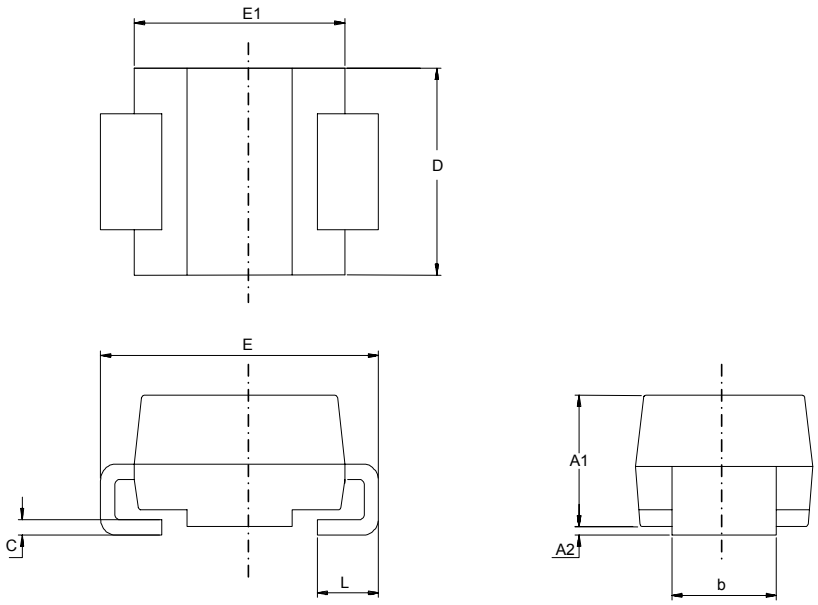
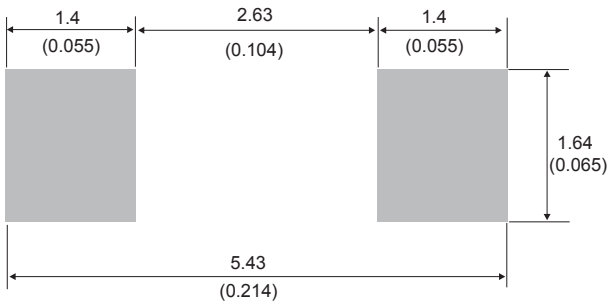


Table 4. SMA package mechanical data

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	1.25	1.65	0.049	0.065
c	0.15	0.40	0.005	0.016
D	2.25	2.90	0.088	0.115
E	4.80	5.35	0.188	0.211
E1	3.95	4.60	0.155	0.182
L	0.75	1.50	0.029	0.060

Figure 16. **SMA recommended footprint in mm (inches)**



2.2 SMA Flat Notch package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Band indicates cathode

Figure 17. SMA Flat Notch package outline

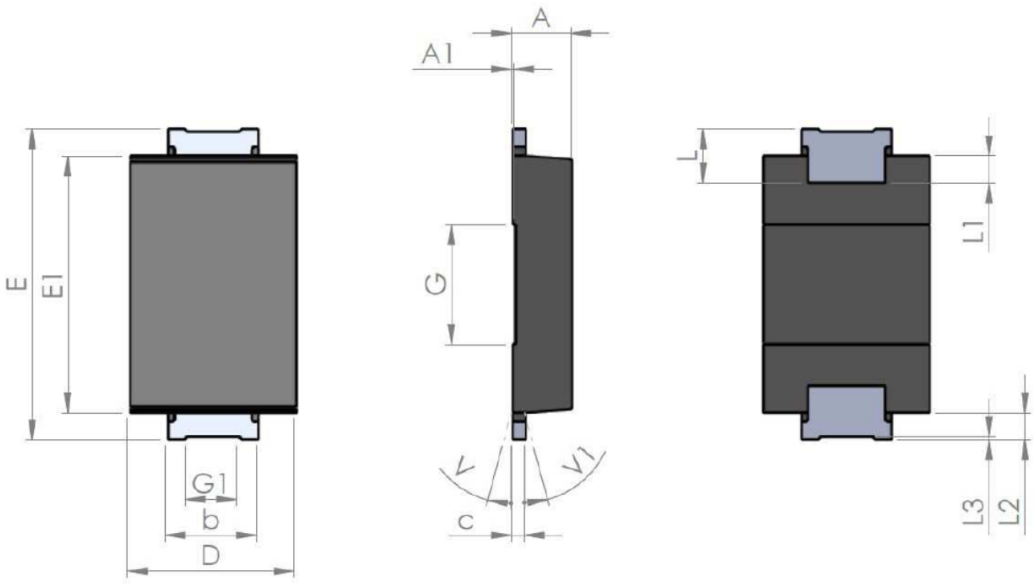
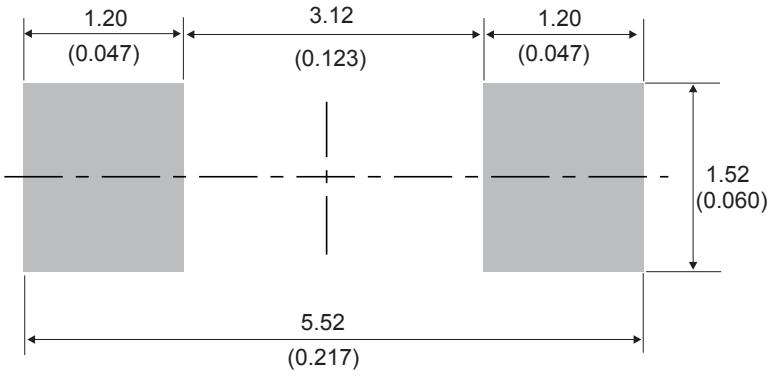


Table 5. SMA Flat Notch package mechanical data

Ref.	Dimensions					
	Millimeters			Inches (for reference only)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A1	0.90		1.10	0.035		0.044
A1		0.05			0.002	
b	1.25		1.65	0.049		0.065
C	0.15		0.40	0.005		0.016
D	2.25		2.90	0.088		0.115
E	5.00		5.35	0.196		0.211
E1	3.95		4.60	0.155		0.182
G		2.00			0.079	
G1		0.85			0.033	
L	0.75		1.20	0.029		
L1		0.45			0.018	
L2		0.45			0.018	
L3		0.05			0.002	
V			8°			8°
V1			8°			8°

Figure 18. SMA Flat Notch recommended footprint in mm (inches)



2.3 SMB Flat package information

- Epoxy meets UL94, V0
- Lead-free package

Figure 19. SMB Flat package outline

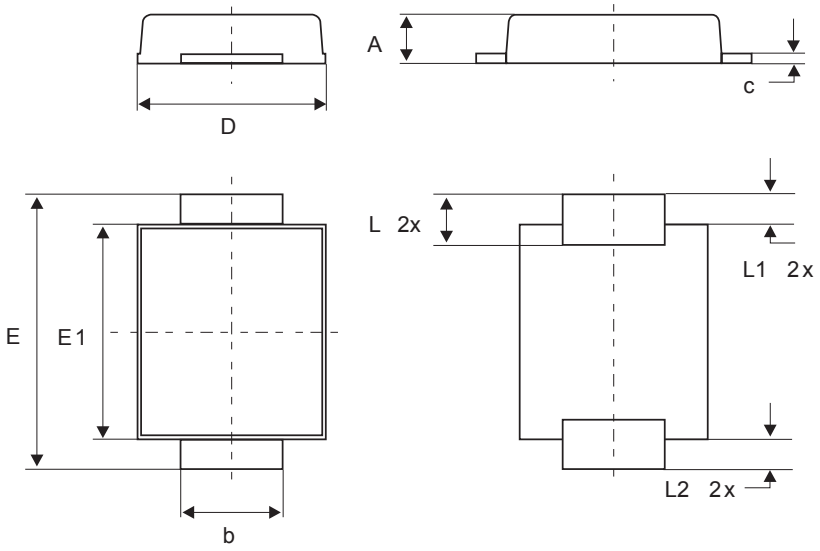
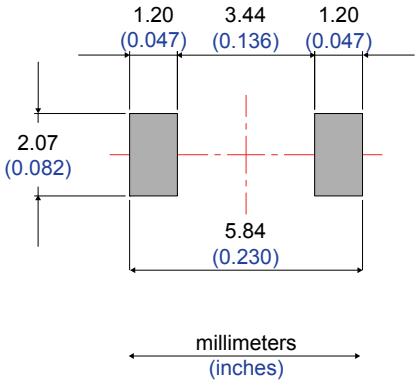


Table 6. SMB Flat mechanical data

Ref.	Dimensions					
	Millimeters			Inches (for reference only)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.90		1.10	0.035		0.043
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
L1		0.40			0.016	
L2		0.60			0.024	

Figure 20. Footprint recommendations, dimensions in mm (inches)



2.4 DO-41 Package information

- Epoxy meets UL 94, V0

Figure 21. **DO-41 package outline**

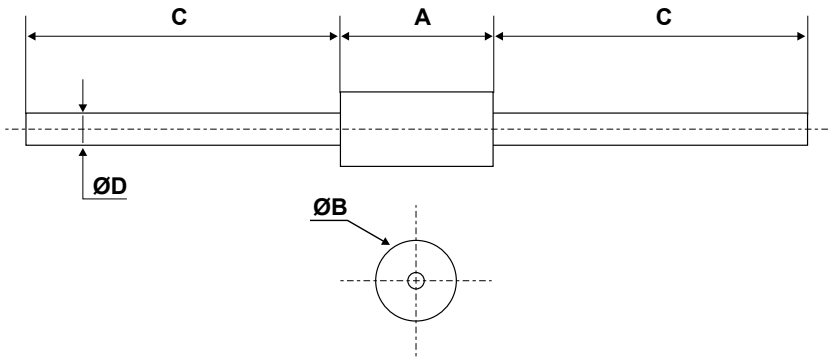


Table 7. **DO-41 package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches (for reference only)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.1	-	5.20	0.160	-	0.205
B	2.00	-	2.71	0.080	-	0.107
C	25.40	-		1.000	-	
D	0.71	-	0.86	0.028	-	0.0034

3 Ordering information

Table 8. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS2L60A	S26	SMA	0.068 g	5000	Tape and reel
STPS2L60AFN	A26	SMA Flat Notch	0.039 g	10 000	Tape and reel
STPS2L60	STPS2L60	DO-41	0.34 g	2000	Ammopack
STPS2L60UF	FG26	SMB Flat	0.050 g	5000	Tape and reel

Revision history

Table 9. Document revision history

Date	Version	Changes
Jul-2003	2A	Last update.
Aug-2004	3	SMA package dimensions update. Reference A1 max changed from 2.70 mm (0.106 inch) to 2.03 mm (0.080 inch).SMA package dimensions update. Reference A1 max changed from 2.70 mm (0.106 inch) to 2.03 mm (0.080 inch).
18-Sep-2008	4	Reformatted to current standards. Added SMB flat package.
30-Sep-2009	5	Updated table 7 package dimensions.
23-Sep-2011	6	Updated SMA package information.
30-Nov-2018	7	Updated Table 1. Absolute ratings (limiting values, at 25 °C, unless otherwise specified) and Figure 4. Normalized avalanche power derating versus pulse duration (T_j = 125 °C).
27-Sep-2019	8	Added Section 2.2 SMA Flat Notch package information.