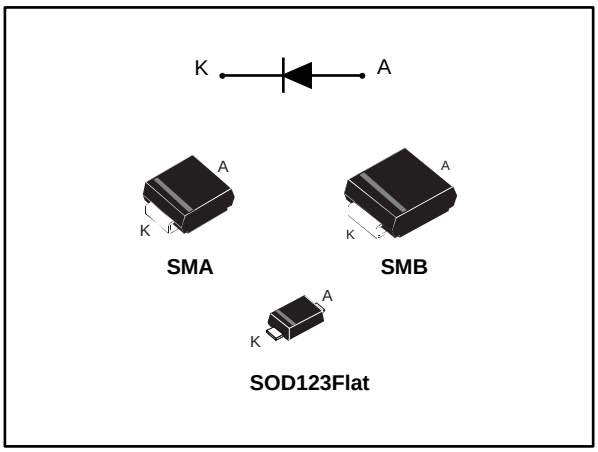
STPS1L40-Y

Automotive low drop power Schottky rectifier

Datasheet - production data



Features

- AEC-Q101 qualified
- Very small conduction losses
- Negligible switching losses
- Low forward voltage drop
- Surface mount miniature packages
- Avalanche capability specified
- PPAP capable

Description

Single chip Schottky rectifiers suited to switched mode power supplies and high frequency DC to DC converters.

Packaged in SOD123Flat, 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.

Table 1: Device summary

Symbol	Value
$I_{F(AV)}$	1 A
V_{RRM}	40 V
V_F (typ.)	0.37 V
T_j (max.)	175 °C

1 Characteristics

Table 2: Absolute ratings (limiting values at 25 °C, unless otherwise specified)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage	T_j = -40 °C to +175 °C	40	V
$I_{F(AV)}$	Average forward current δ = 0.5, square wave	SMA/SMB: T_L = 155 °C	1	A
		SOD123Flat: T_L = 160 °C		
I_{FSM}	Surge non repetitive forward current, t_p = 10 ms sinusoidal	SMA/SMB	60	A
		SOD123Flat	50	
P_{ARM}	Repetitive peak avalanche power	t_p = 10 µs, T_j = 125 °C	65	W
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Operating junction temperature range(1)		-40 to +175	

Notes:

(1)$(dP_{tot}/dT_j) < (1/R_{th(j-a)})$ condition to avoid thermal runaway for a diode on its own heatsink.

Table 3: Thermal parameters

Symbol	Parameter		Max. value	Unit
$R_{th(j-l)}$	Junction to lead	SMA	30	°C/W
		SMB	25	
		SOD123Flat	20	

Table 4: Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-		35	µA
		T_j = 125 °C		-	6	10	mA
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 1 A	-		0.50	V
		T_j = 125 °C		-	0.37	0.42	

Notes:

(1)Pulse test: t_p = 5 ms, δ < 2%

(2)Pulse test: t_p = 380 µs, δ < 2%

To evaluate the conduction losses, use the following equation:

$P = 0.23 \times I_{F(AV)} + 0.19 \times I_{F^2(RMS)}$

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 in a power diode)

1.1 Characteristics (curves)

Figure 1: Average forward power dissipation versus average forward current

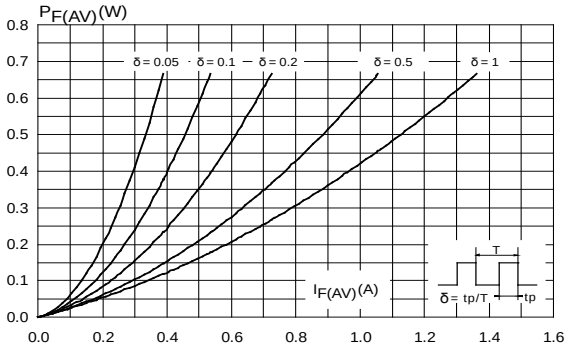


Figure 2: Average forward current versus ambient temperature (δ = 0.5)

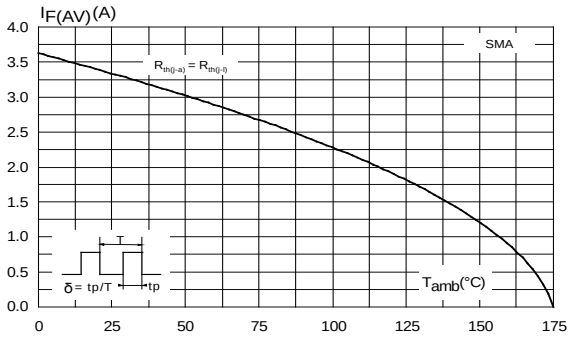


Figure 3: Average forward current versus ambient temperature (δ = 0.5)

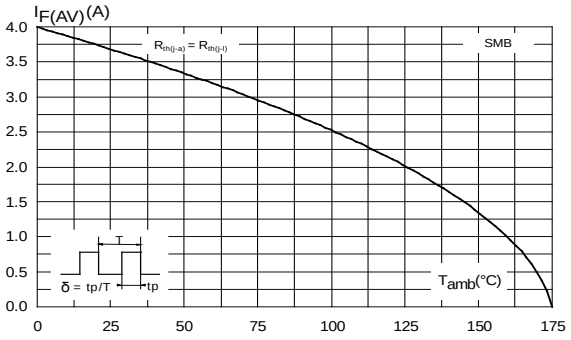


Figure 4: Average forward current versus ambient temperature (δ = 0.5)

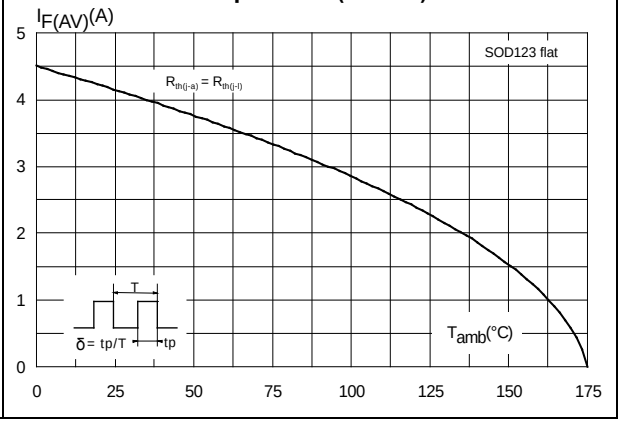


Figure 5: Normalized avalanche power derating versus pulse duration (T_j = 125 °C)

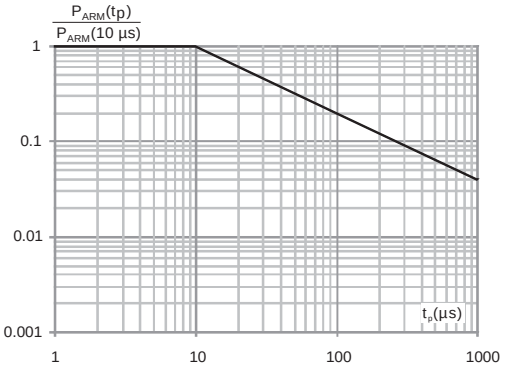


Figure 6: Relative variation of thermal impedance junction to ambient versus pulse duration

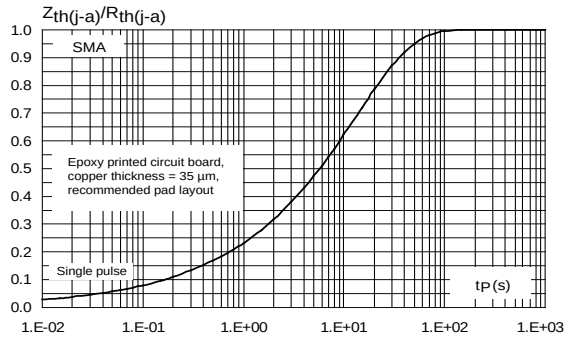


Figure 7: Relative variation of thermal impedance junction to ambient versus pulse duration

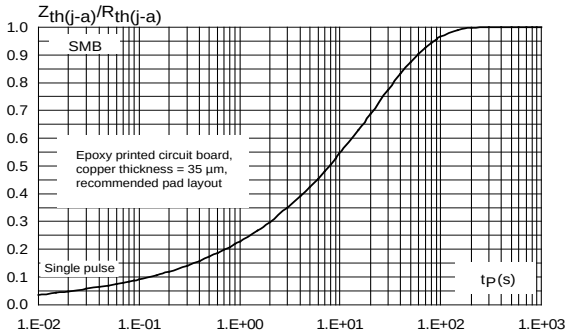


Figure 8: Relative variation of thermal impedance junction to lead versus pulse duration

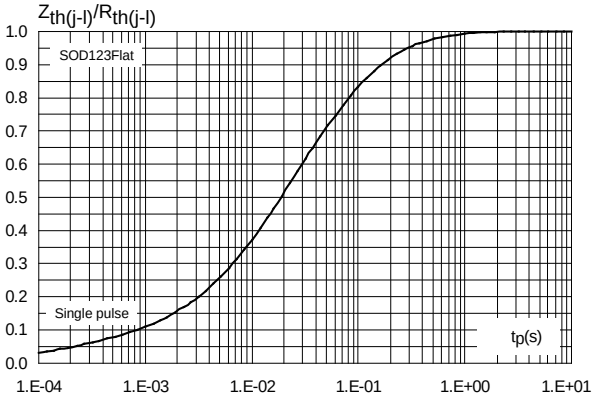


Figure 9: Reverse leakage current versus reverse voltage applied (typical values)

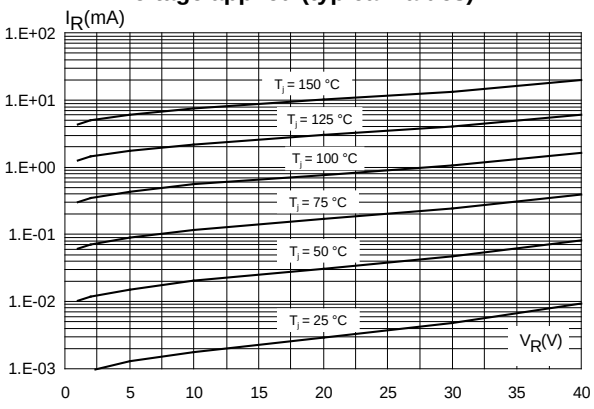


Figure 10: Junction capacitance versus reverse voltage applied (typical values)

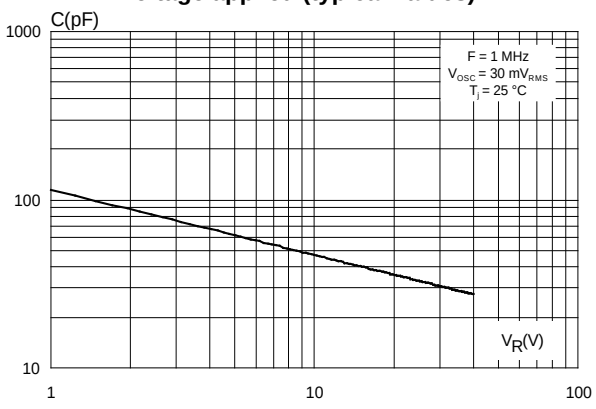


Figure 11: Forward voltage drop versus forward current (typical values)

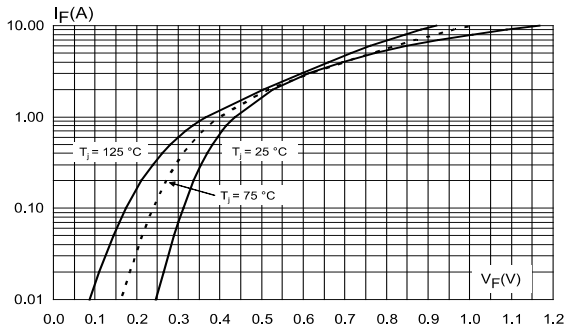


Figure 12: Thermal resistance junction to ambient versus copper surface under each lead (typical values)

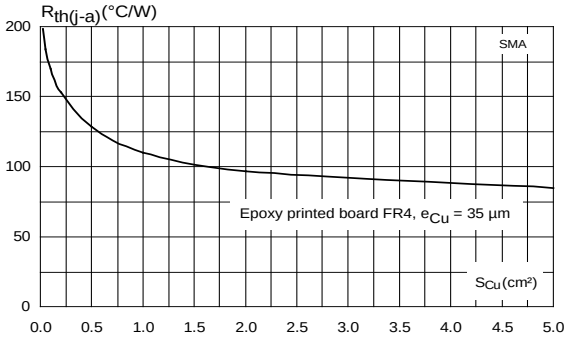


Figure 13: Thermal resistance junction to ambient versus copper surface under each lead (typical values)

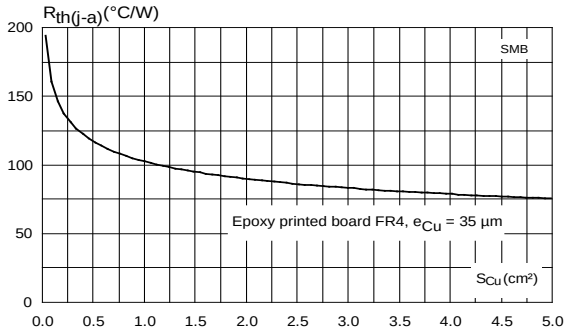
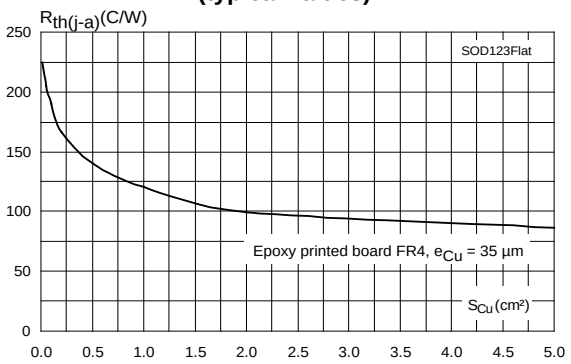


Figure 14: Thermal resistance junction to ambient versus copper surface under each lead (typical values)



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.

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

2.1 SMA package information

Figure 15: SMA package outline

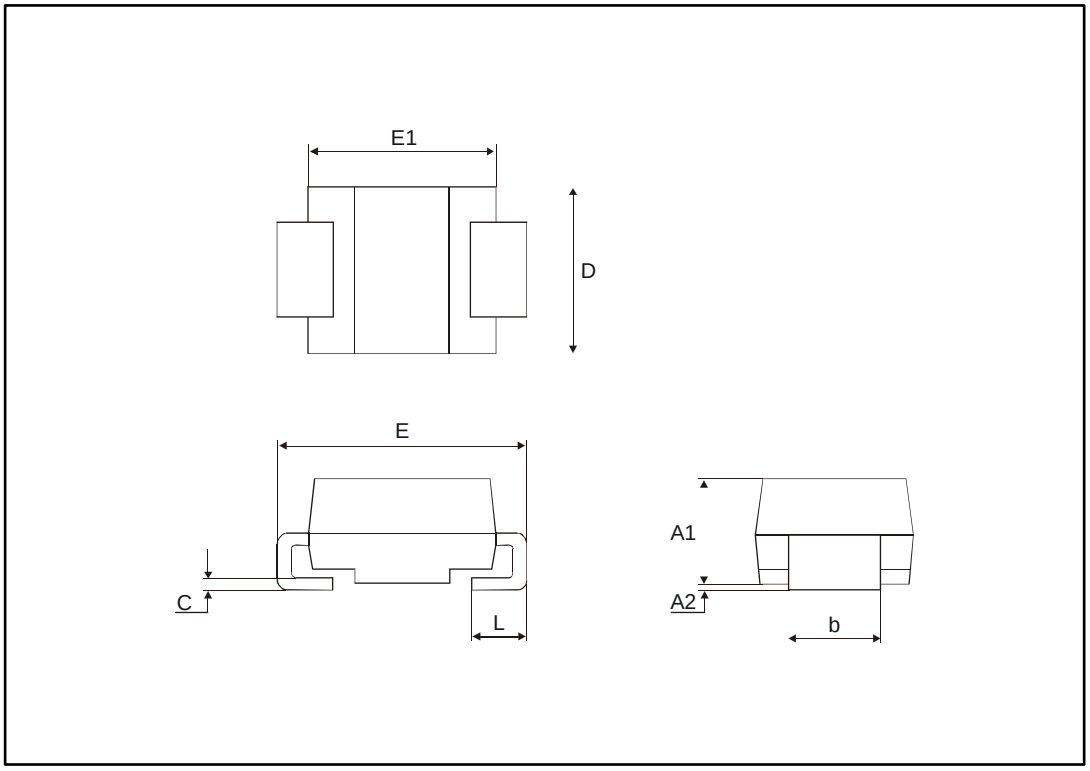
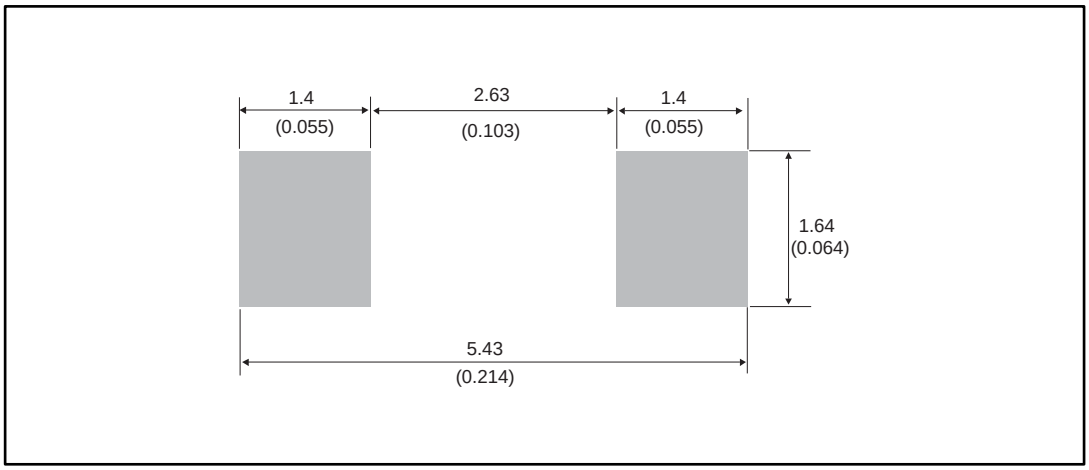


Table 5: SMA package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.097
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: SMA recommended footprint in mm (inches)



2.2 SMB package information

Figure 17: SMB package outline

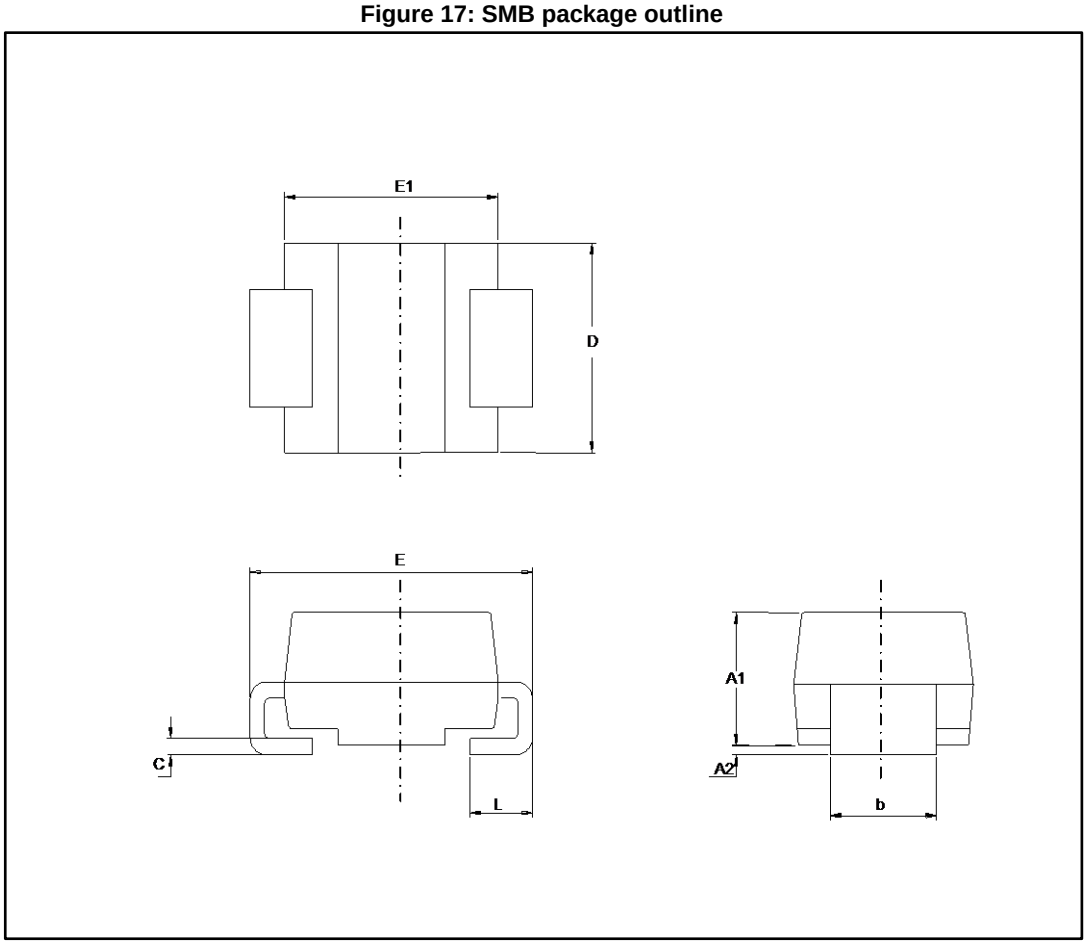
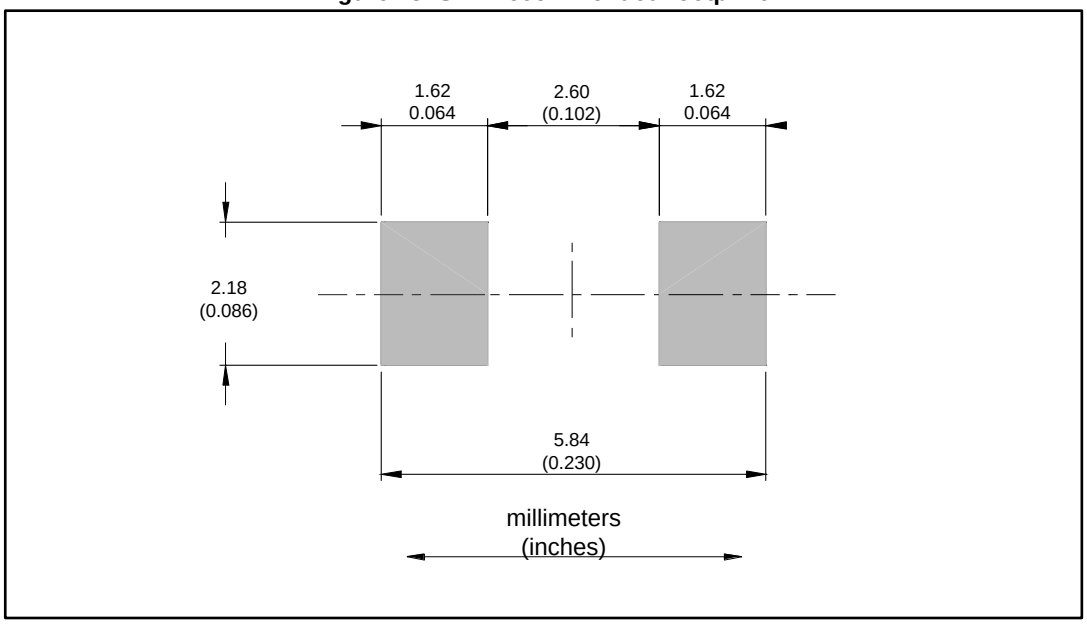


Table 6: SMB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.0748	0.0965
A2	0.05	0.20	0.0020	0.0079
b	1.95	2.20	0.0768	0.0867
c	0.15	0.40	0.0059	0.0157
D	3.30	3.95	0.1299	0.1556
E	5.10	5.60	0.2008	0.2205
E1	4.05	4.60	0.1594	0.1811
L	0.75	1.50	0.0295	0.0591

Figure 18: SMB recommended footprint



2.3 SOD123Flat package information

Figure 19: SOD123Flat package outline

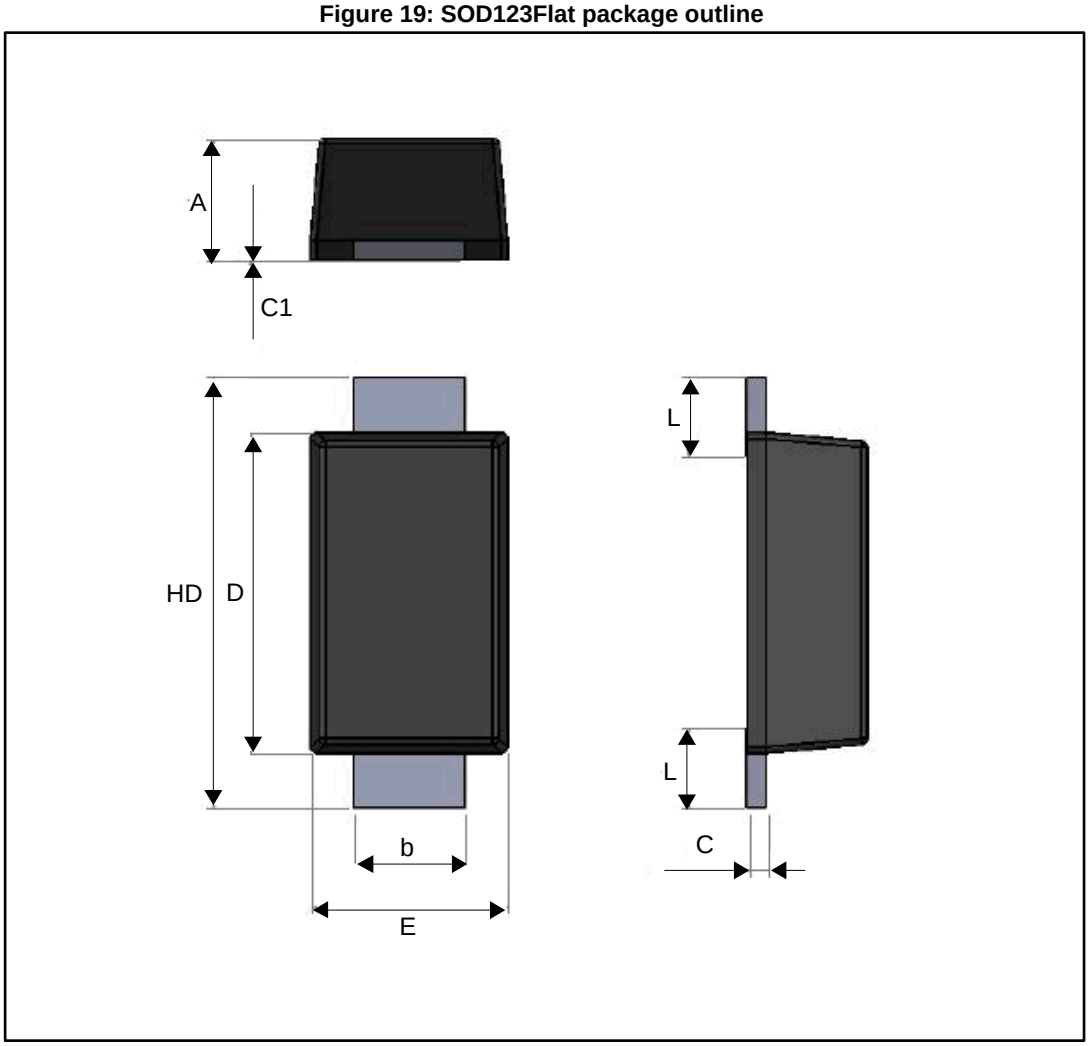
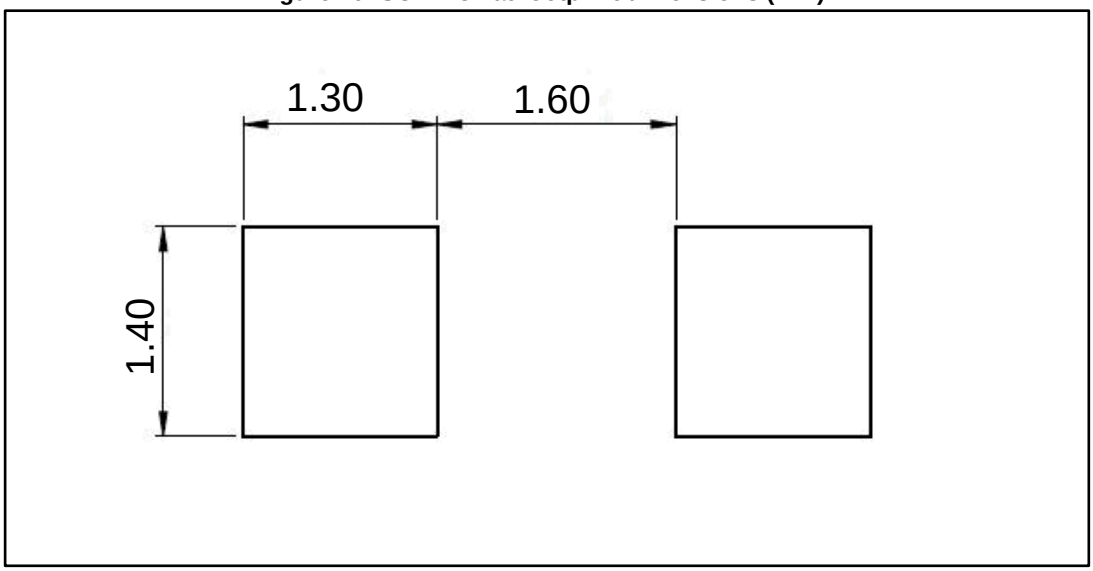


Table 7: SOD123Flat package mechanical data

Ref.	Dimensions		
	Millimeters		
	Min.	Typ.	Max.
A	0.86	0.98	1.10
b	0.80	0.90	1.00
c	0.08	0.15	0.25
c1	0.00		0.10
D	2.50	2.60	2.70
E	1.50	1.60	1.80
HD	3.30	3.50	3.70
L	0.45	0.65	0.85

Figure 20: SOD123Flat footprint dimensions (mm)



3 Ordering information

Table 8: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS1L40AY	GB4Y	SMA	68 mg	5000	Tape and reel
STPS1L40UY	GC4Y	SMB	107 mg	2500	Tape and reel
STPS1L40ZFY	1Y4	SOD123Flat	12.5 mg	3000	Tape and reel

4 Revision history

Table 9: Document revision history

Date	Revision	Changes
21-Oct-2011	1	First issue.
01-Oct-2016	2	Added SOD123Flat package.

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