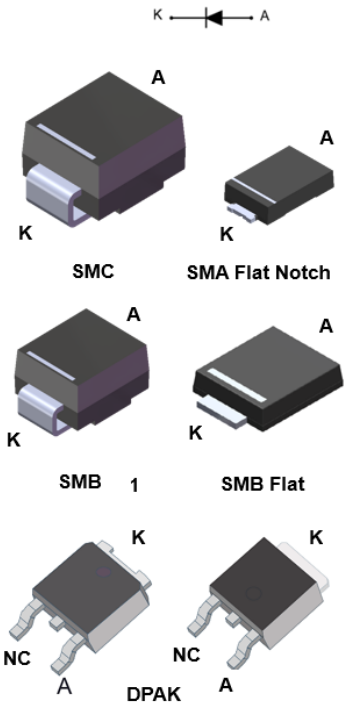
STPS340

Datasheet

40 V, 3 A power Schottky rectifier



Product status
STPS340

Product summary	
Symbol	**Value**
$I_{F(AV)}$	3 A
V_{RRM}	40 V
$T_{j(max.)}$	150 °C
$V_{F(typ.)}$	0.52 V

Features

- Very small conduction losses
- Negligible switching losses
- Low forward voltage drop
- Low thermal resistance
- Extremely fast switching
- Surface mount package
- Avalanche rated
- ECOPACK2 component

Applications

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

Description

Single chip Schottky rectifier suited for switch mode power supplies and high frequency DC to DC converters.

Packaged in SMA Flat Notch, SMB, SMB Flat, SMC and DPAK, the STPS340 is ideal for surface mounting and used in low voltage, high frequency inverters, free wheeling and polarity protection applications.

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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
$I_{F(RMS)}$	Forward rms current		DPAK	6	A
$I_{F(AV)}$	Average forward current, δ = 0.5, square wave	SMA Flat Notch	T_L = 105 °C	3	A
		SMB	T_L = 95 °C		
		SMB Flat	T_L = 115 °C		
		SMC	T_L = 105 °C		
		DPAK	T_C = 135°C		
I_{FSM}	Surge non repetitive forward current	SMA Flat Notch	t_p = 10 ms sinusoidal	105	A
		All others		75	A
P_{ARM}	Repetitive peak avalanche power		t_p = 10 µs, T_j = 125 °C	90	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	SMA Flat Notch	20	°C/W
		SMB	25	
		SMB Flat	15	
		SMC	20	
$R_{th(j-c)}$	Junction to case	DPAK	5.5	

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	$V_R = V_{RRM}$	-		20	µA
		T_j = 125 °C		-	2	10	mA
V_F(1)	Forward voltage drop	T_j = 25 °C	I_F = 3 A	-		0.63	V
		T_j = 125 °C		-	0.52	0.57	
		T_j = 25 °C	I_F = 6 A	-		0.84	
		T_j = 125 °C		-	0.63	0.72	

1. *Pulse test: t_p = 380 µs, δ < 2%*

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To evaluate the conduction losses, use the following equation:

$P = 0.42 \times I_{F(AV)} + 0.050 \times I_F{}^2{}_{(RMS)}$

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

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1.1 Characteristics (curves)

Figure 1. Average forward power dissipation versus average forward current

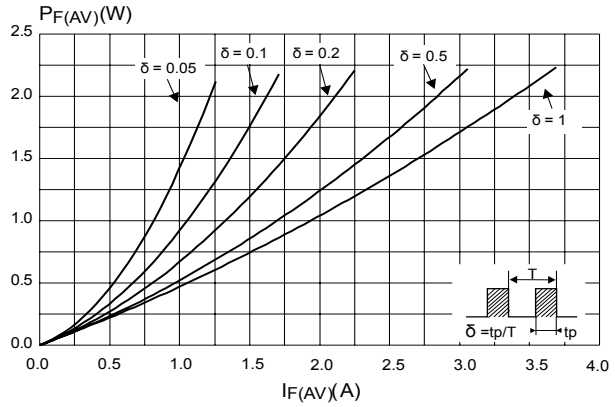

Figure 2. Average forward current versus ambient temperature (δ = 0.5) (SMB, SMC, DPAK)

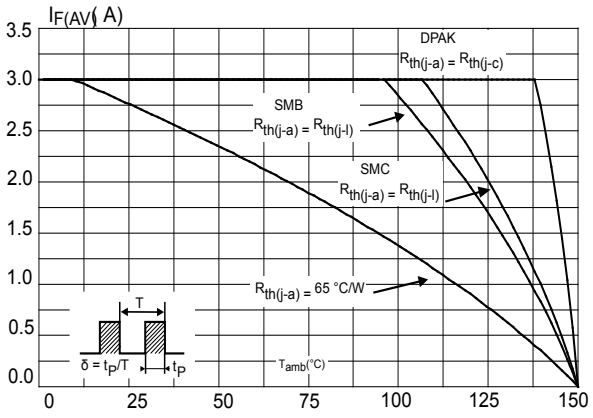

Figure 3. Average forward current versus ambient temperature (δ = 0.5, SMB Flat)

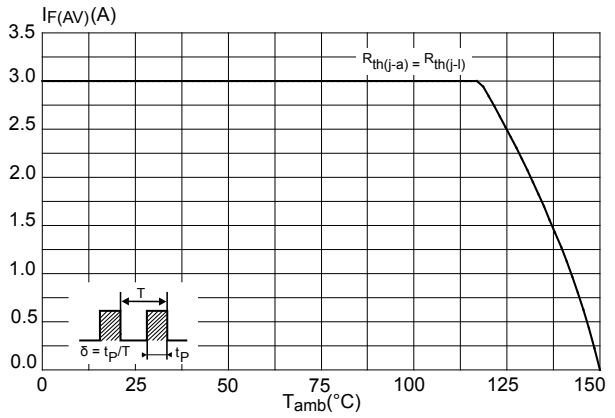

Figure 4. Normalized avalanche power derating versus pulse duration (T_j = 125 °C)

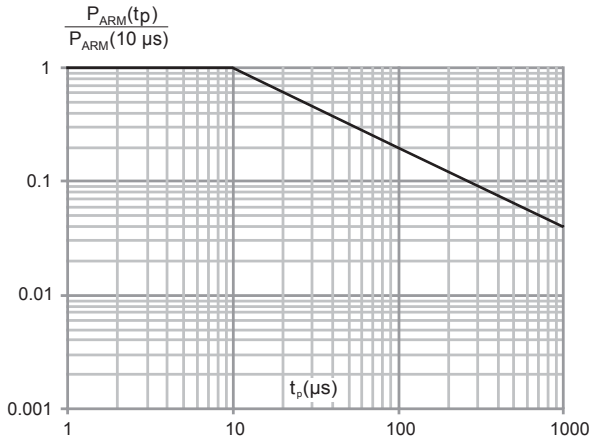

Figure 5. Relative variation of thermal impedance junction to ambient versus pulse duration (SMB)

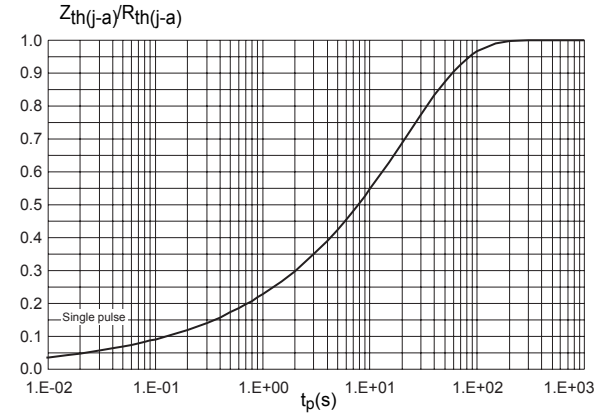

Figure 6. Relative variation of thermal impedance junction to lead versus pulse duration (SMB flat)

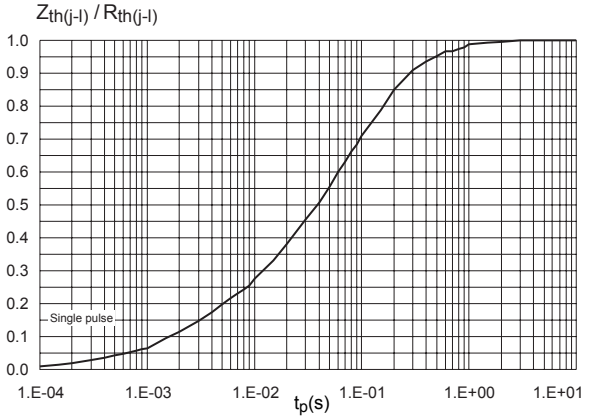

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Figure 7. Relative variation of thermal impedance junction to ambient versus pulse duration (SMC)

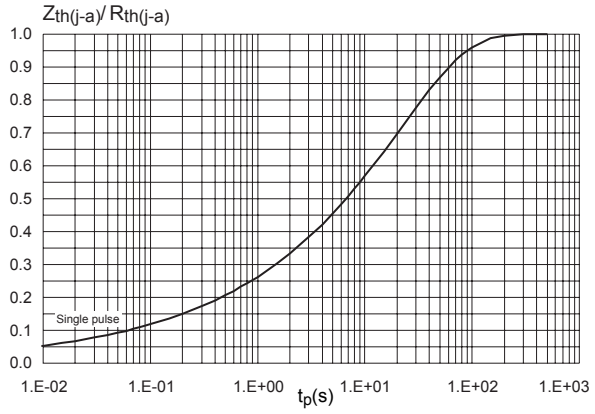

Figure 8. Relative variation of thermal impedance junction to case versus pulse duration (DPAK)

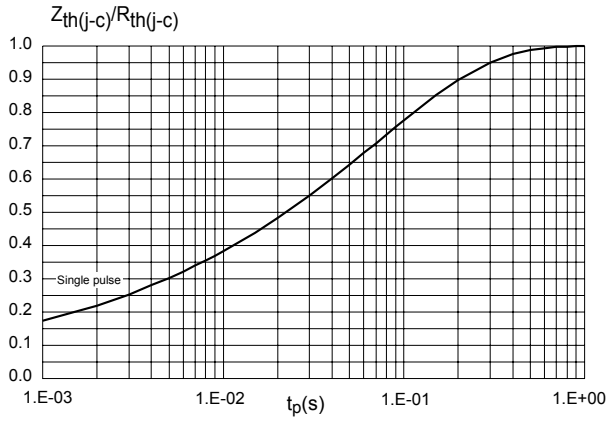

Figure 9. Reverse leakage current versus reverse voltage applied (typical values)

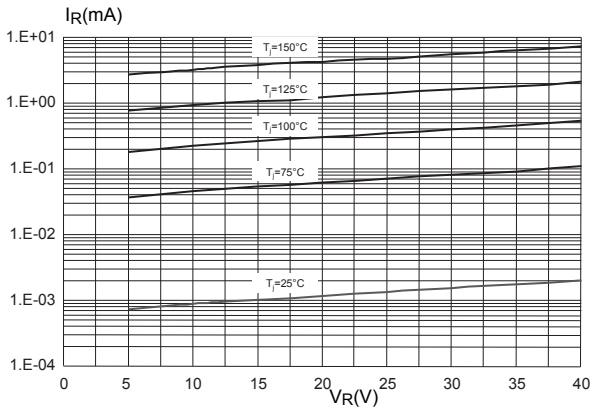

Figure 10. Junction capacitance versus reverse voltage applied (typical values)

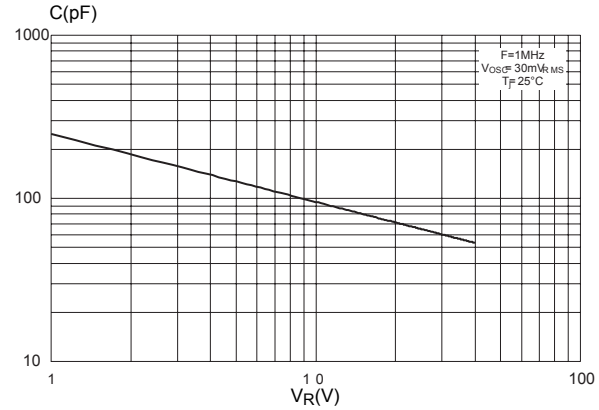

Figure 11. Forward voltage drop versus forward current

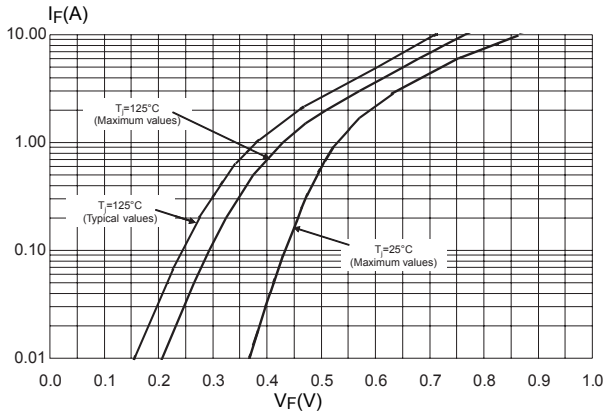

Figure 12. Thermal resistance junction to ambient versus copper surface under each lead (SMA Flat Notch)

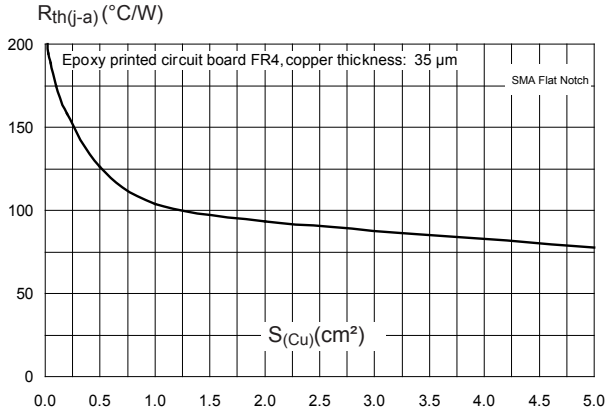

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Figure 13. Thermal resistance junction to ambient versus copper surface under each lead (SMB)

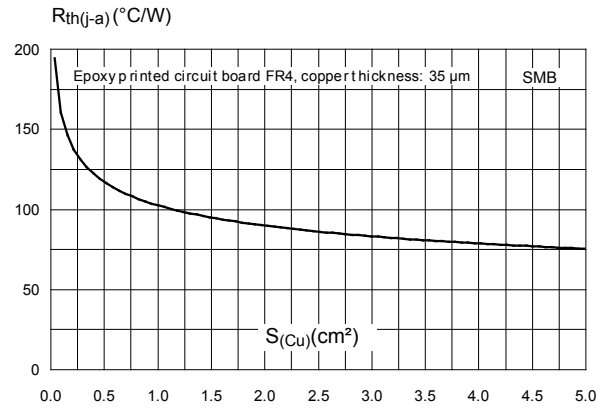


Figure 14. Thermal resistance junction to ambient versus copper surface under each lead (SMB flat)

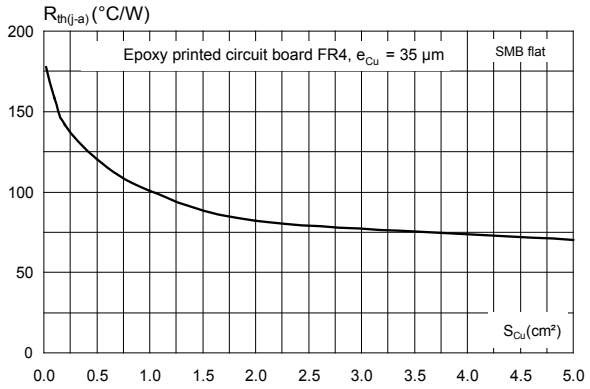


Figure 15. Thermal resistance junction to ambient versus copper surface under each lead (SMC)

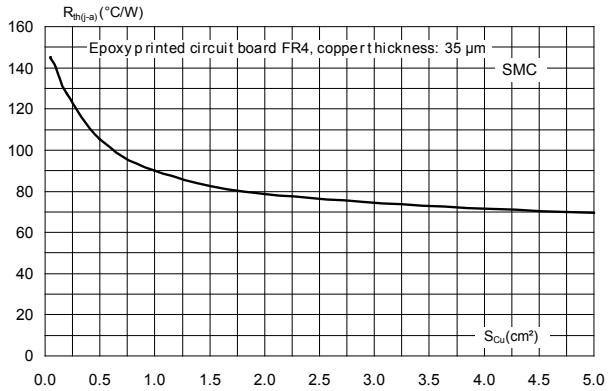
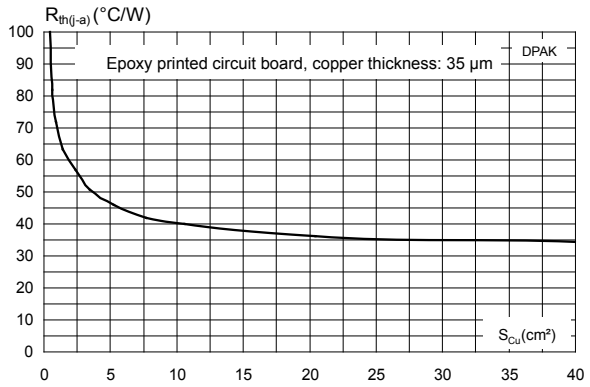


Figure 16. Thermal resistance junction to ambient versus copper surface under tab (DPAK)



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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 Flat Notch package information

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

Figure 17. SMA Flat Notch package outline

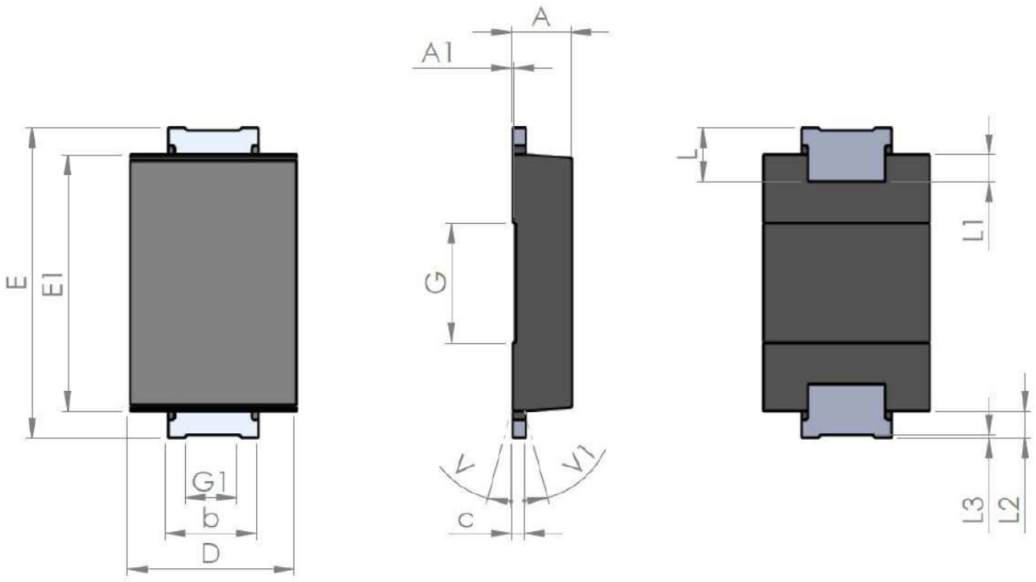

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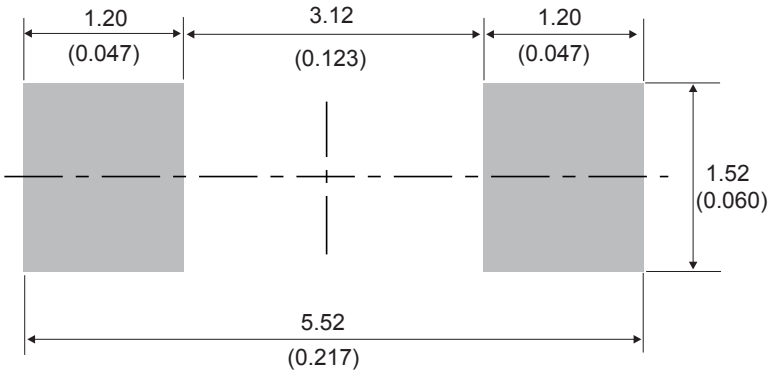
Table 4. SMA Flat Notch package mechanical data

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)



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2.2 SMB package information

- Epoxy meets UL94, V0
- Lead-free package

Figure 19. SMB package outline

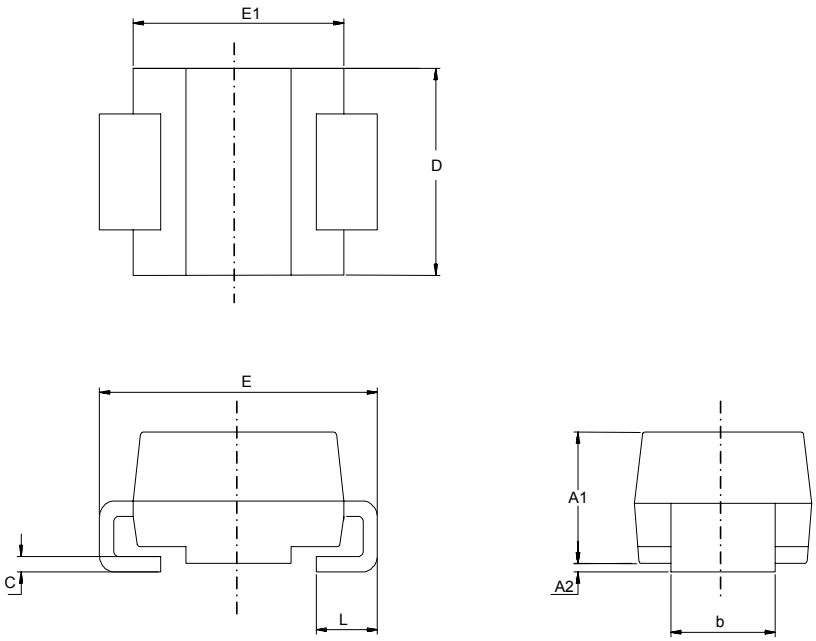

Table 5. SMB package mechanical data

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

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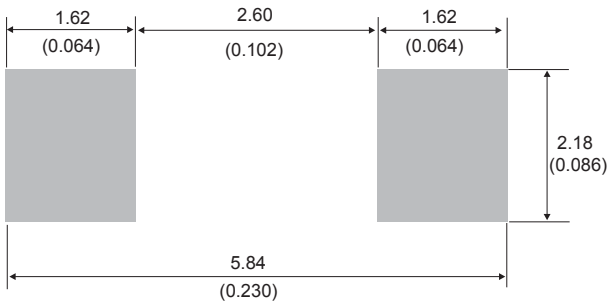
Figure 20. **SMB recommended footprint**



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2.3 SMB Flat package information

- Epoxy meets UL94, V0
- Lead-free package

Figure 21. SMB Flat package outline

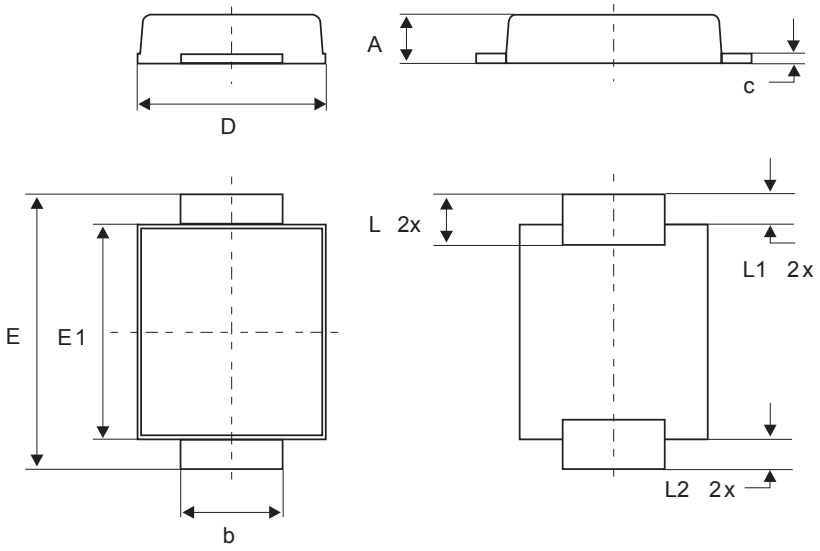

Table 6. SMB Flat mechanical data

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	

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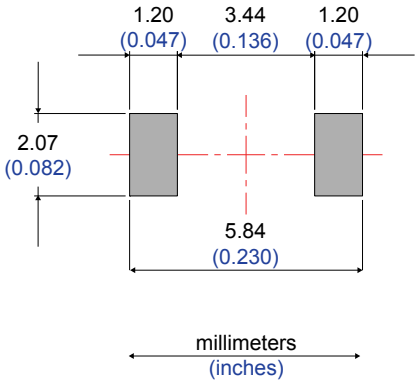
Figure 22. Footprint recommendations, dimensions in mm (inches)



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2.4 SMC package information

- Epoxy meets UL94, V0

Figure 23. **SMC package outline**

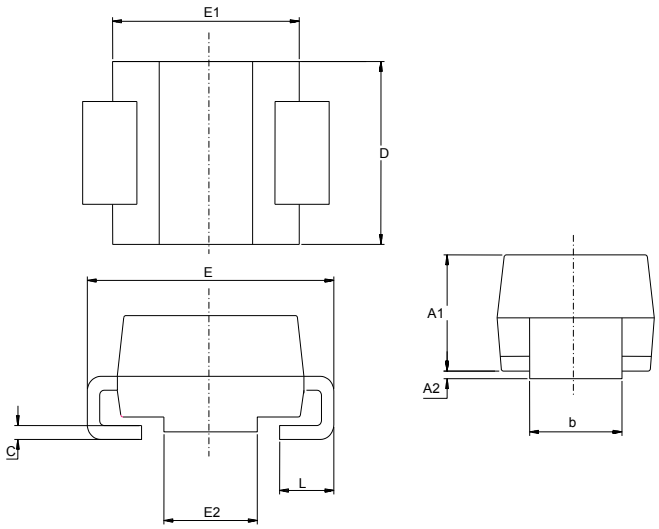

Table 7. **SMC package mechanical data**

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.0748	0.0965
A2	0.05	0.20	0.0020	0.0079
b	2.90	3.20	0.1142	0.1260
c	0.15	0.40	0.0059	0.0157
D	5.55	6.25	0.2185	0.2461
E	7.75	8.15	0.3051	0.3209
E1	6.60	7.15	0.2598	0.2815
E2	4.40	4.70	0.1732	0.1850
L	0.75	1.50	0.0295	0.0591

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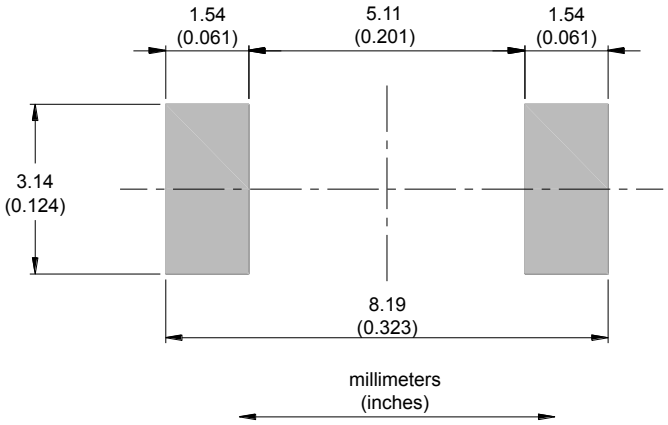
Figure 24. **SMC recommended footprint**



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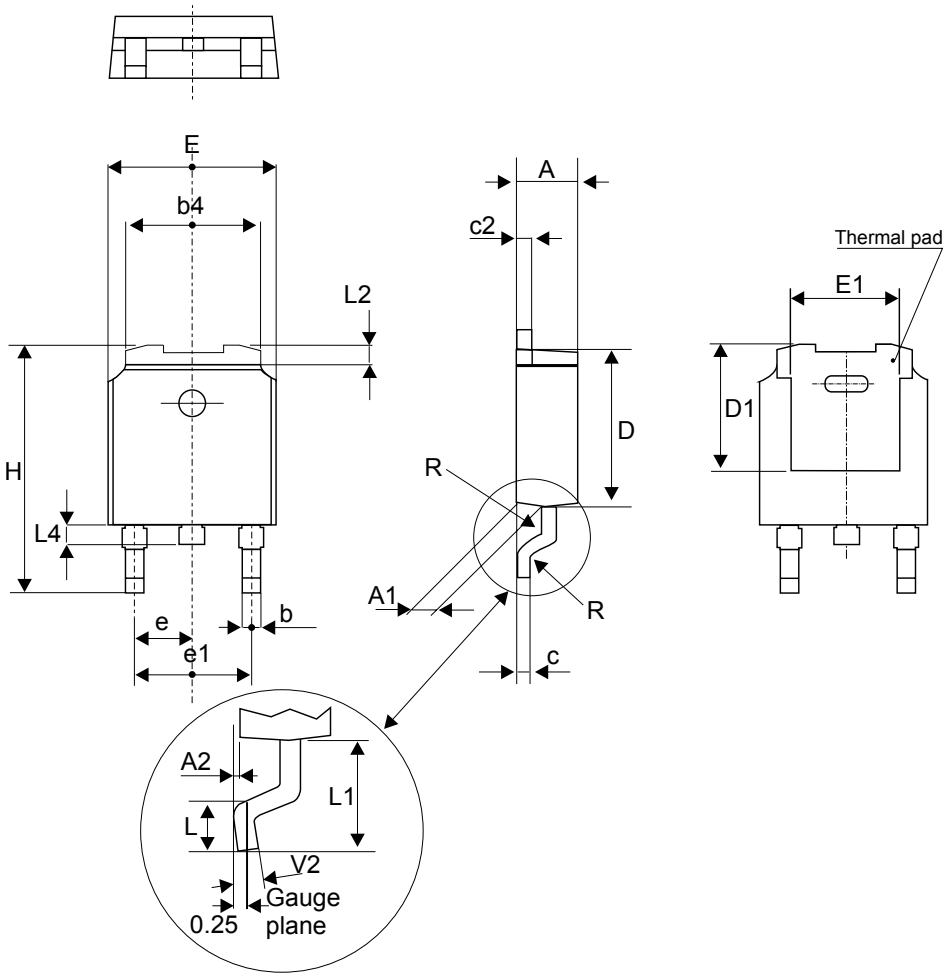
2.5 DPAK package information

- Epoxy meets UL 94,V0
- Cooling method: by conduction (C)

Figure 25. DPAK package outline



Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

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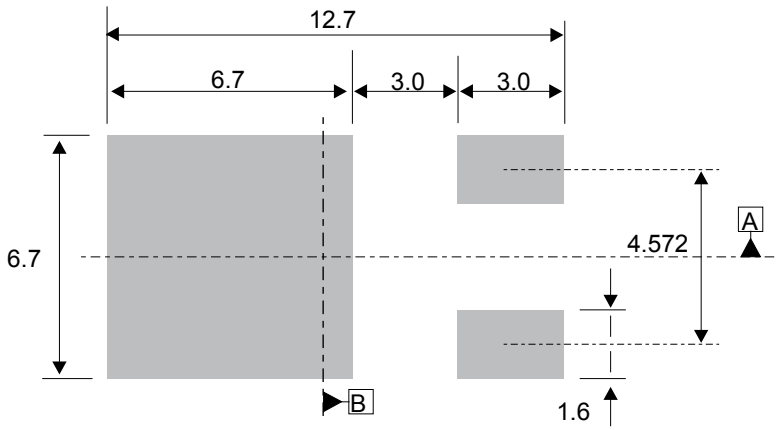
Table 8. **DPAK package mechanical data**

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	Min.	Max.	Min.	Max.
A	2.18	2.40	0.085	0.094
A1	0.90	1.10	0.035	0.043
A2	0.03	0.23	0.001	0.009
b	0.64	0.90	0.025	0.035
b4	4.95	5.46	0.194	0.215
c	0.46	0.61	0.018	0.024
c2	0.46	0.60	0.018	0.023
D	5.97	6.22	0.235	0.244
D1	4.95	5.60	0.194	0.220
E	6.35	6.73	0.250	0.265
E1	4.32	5.50	0.170	0.216
e	2.286 typ.		0.090 typ.	
e1	4.40	4.70	0.173	0.185
H	9.35	10.40	0.368	0.409
L	1.0	1.78	0.039	0.070
L2		1.27		0.050
L4	0.60	1.02	0.023	0.040
V2	-8°	+8°	-8°	+8°

Figure 26. **DPAK recommended footprint (dimensions in mm)**



The device must be positioned within ⌖ 0.05 A B

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3 Ordering information

Table 9. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS340AFN	A340	SMA Flat Notch	0.039 g	10 000	Tape and reel
STPS340U	U34	SMB	0.107 g	2500	Tape and reel
STPS340UF	FU34	SMB Flat	0.050 g	5000	Tape and reel
STPS340S	S34	SMC	0.243 g	10 000	Tape and reel
STPS340B-TR	S3 40	DPAK	0.320 g	2500	Tape and reel

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Revision history

Table 10. **Document revision history**

Date	Version	Changes
Jul-2003	7	Last update.
Feb-2005	8	Layout update. No content change.
08-Feb-2007	9	Reformatted to current standard. Added ECOPACK statement. Added SMBflat package.
10-Feb-2009	10	Updated ECOPACK statement. Corrected Y axis in Figure 10.
23-Apr-2015	11	Updated DPAK and reformatted to current standard.
22-Sep-2016	12	Updated DPAK package information and reformatted to current standard.
08-Oct-2019	13	Added Section 2.1 SMA Flat Notch package information.

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