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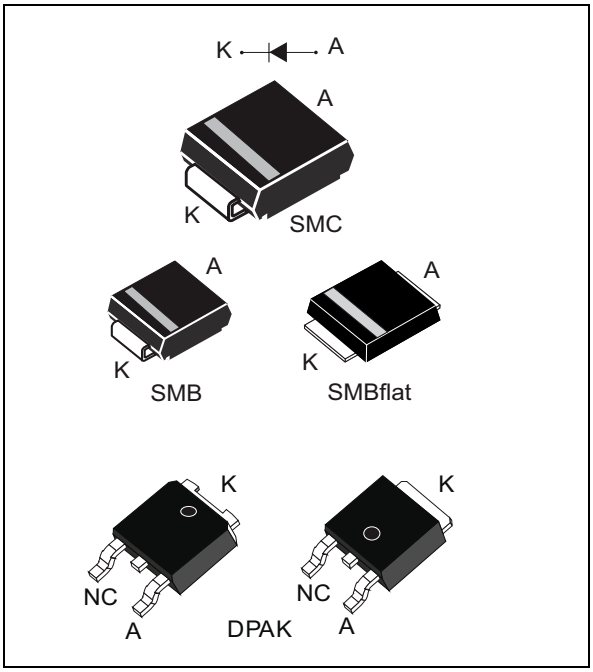
STPS340

Power Schottky rectifier

Datasheet – production data



Description

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

Packaged in DPAK, SMC, SMB, and SMBflat, this device is intended for use in low and medium voltage operation, high frequency inverters, free wheeling and polarity protection applications where low switching losses are required.

Table 1. Device 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 mounted device
- Avalanche capability specified
- ECOPACK®2 compliant component for DPAK on demand

1 Characteristics

Table 2. Absolute ratings (limiting values at T_{amb} = 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	T_c = 135 °C	DPAK	3	A
		T_l = 105 °C	SMC		
		T_l = 95 °C	SMB		
		T_l = 115 °C	SMBflat		
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		75	A
P_{ARM}(1)	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(2)			150	°C

1. For pulse time duration derating, please refer to *Figure 4*. More details regarding the avalanche energy measurements and diode validation in the avalanche are provided in the application notes AN1768 and AN2025.
2. $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ 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	SMC	20	°C/W
		SMB	25	
		SMBflat	15	
$R_{th(j-c)}$	Junction to case	DPAK	5.5	

Table 4. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-		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%

To evaluate the conduction losses, use the following equation:
$P = 0.42 \times I_{F(AV)} + 0.050 \times I_F{}^2{}_{(RMS)}$

Figure 1. Average forward power dissipation versus average forward current

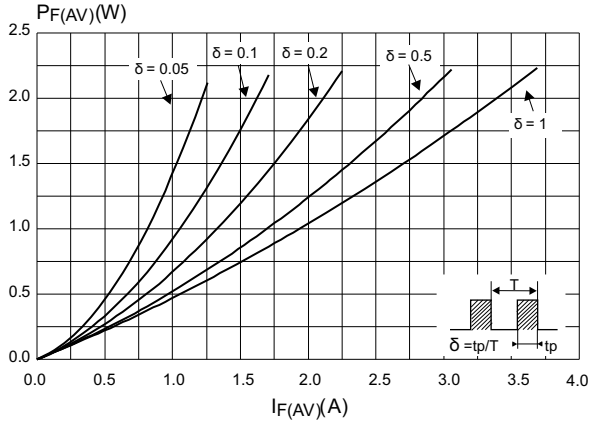


Figure 2. Average forward current versus ambient temperature (δ = 0.5)(DPAK, SMB, SMC)

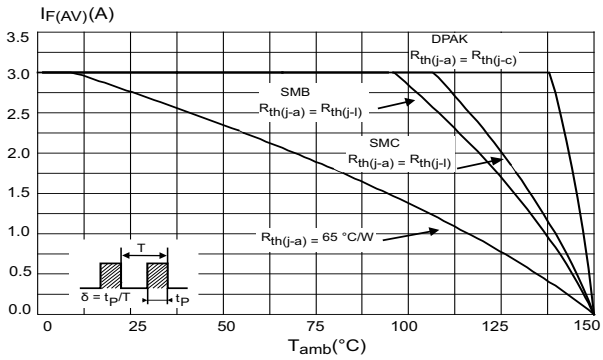


Figure 3. Average forward current versus ambient temperature (δ = 0.5) (SMBflat)

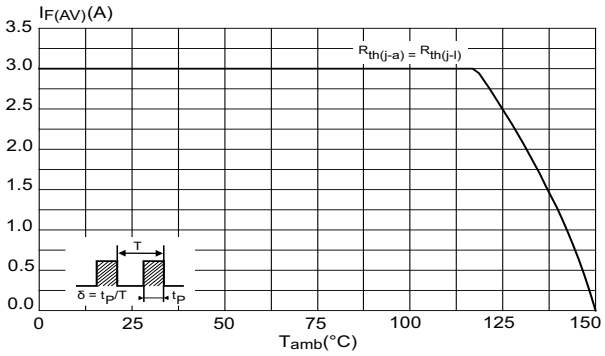


Figure 4. Normalized avalanche power derating versus pulse duration (T_j = 125 °C)

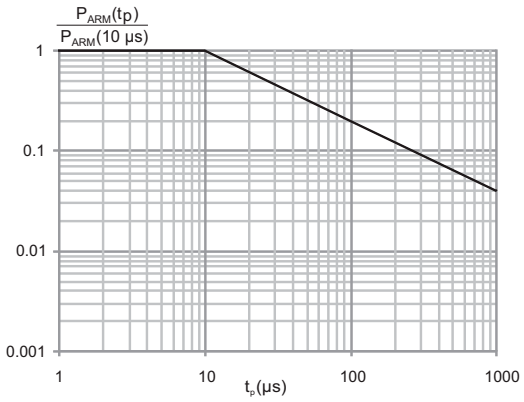


Figure 5. Relative variation of thermal impedance junction to case versus pulse duration (DPAK)

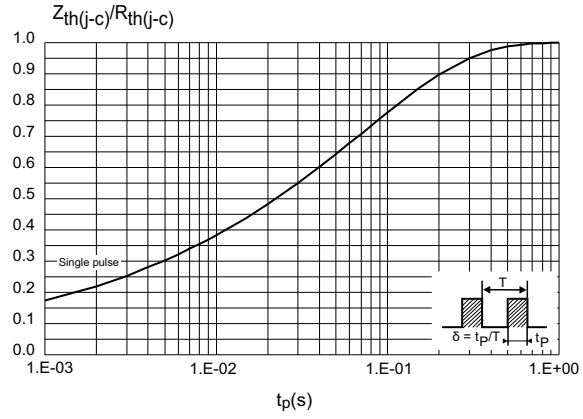


Figure 6. Relative variation of thermal impedance junction to ambient versus pulse duration (SMB)

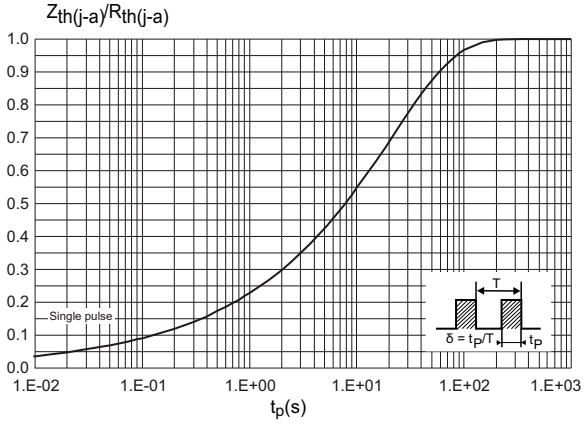


Figure 7. Relative variation of thermal impedance junction to ambient versus pulse duration (SMC)

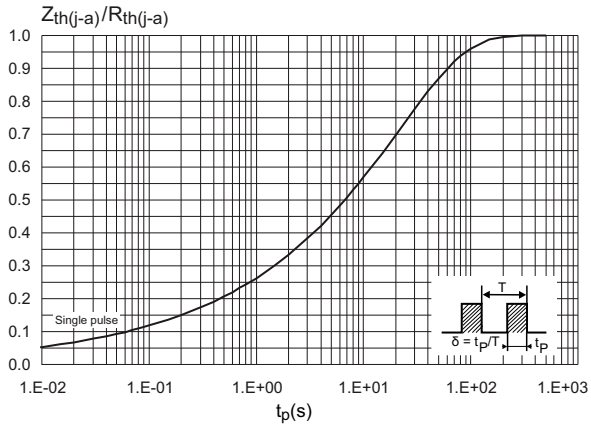


Figure 8. Relative variation of thermal impedance junction to lead versus pulse duration (SMBflat)

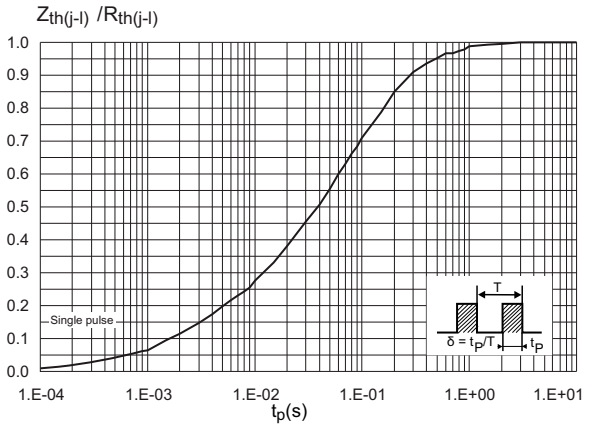


Figure 9. Reverse leakage current versus reverse voltage applied (typical values)

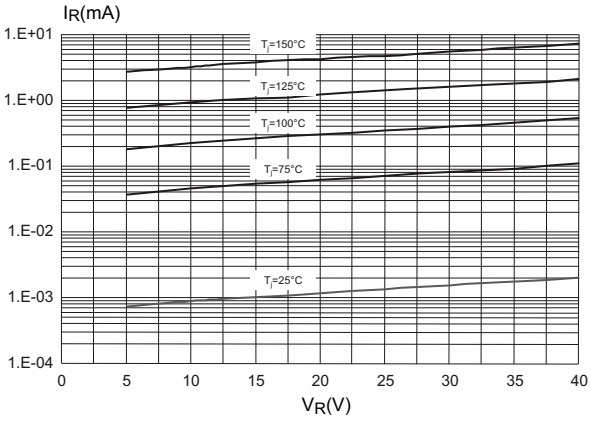


Figure 10. Junction capacitance versus reverse voltage applied (typical values)

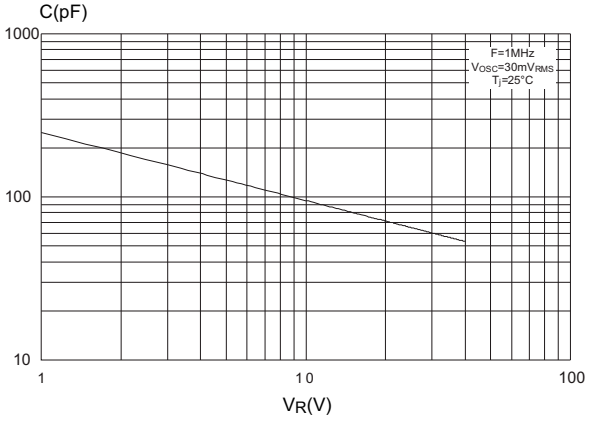


Figure 11. Forward voltage drop vs. forward current

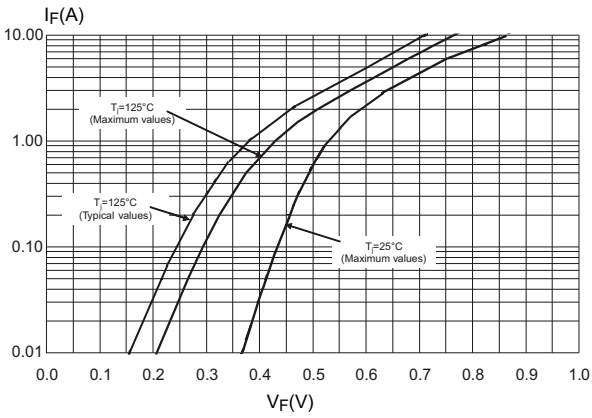


Figure 12. Thermal resistance junction to ambient versus copper surface under tab

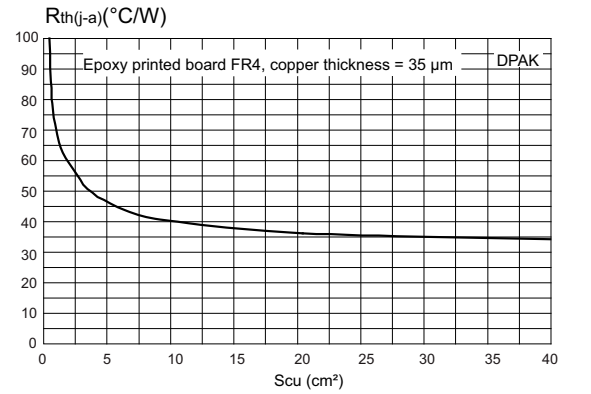


Figure 13. Thermal resistance junction to ambient versus copper surface under each lead

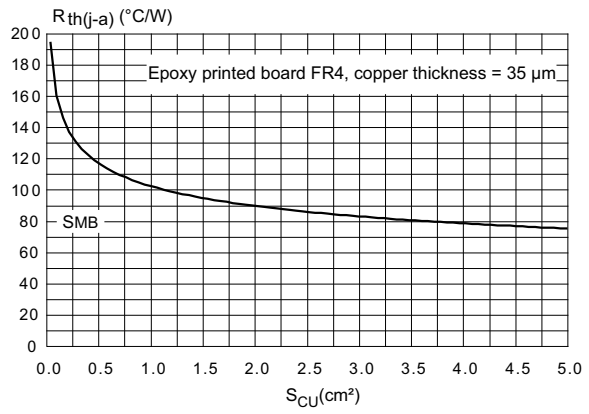


Figure 14. Thermal resistance junction to ambient versus copper surface under each lead

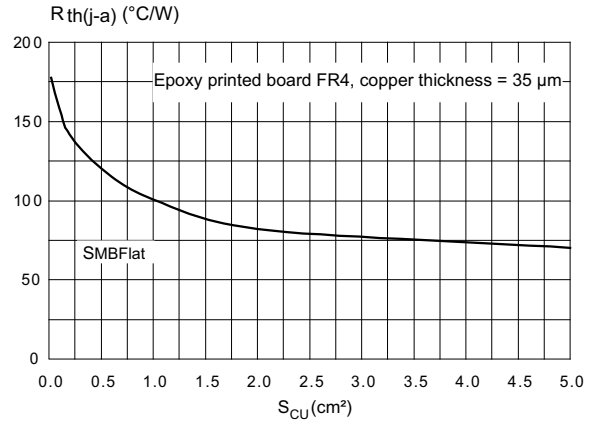
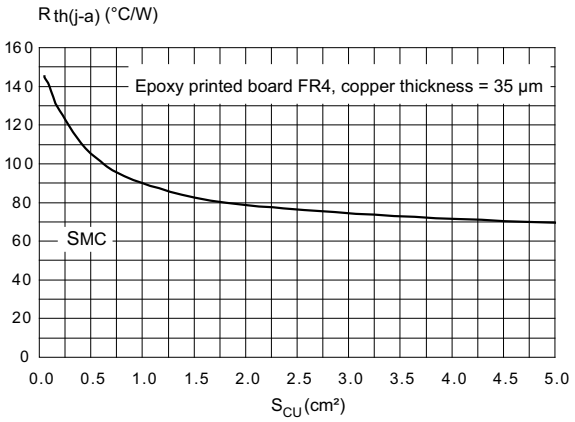


Figure 15. Thermal resistance junction to ambient versus copper surface under each lead



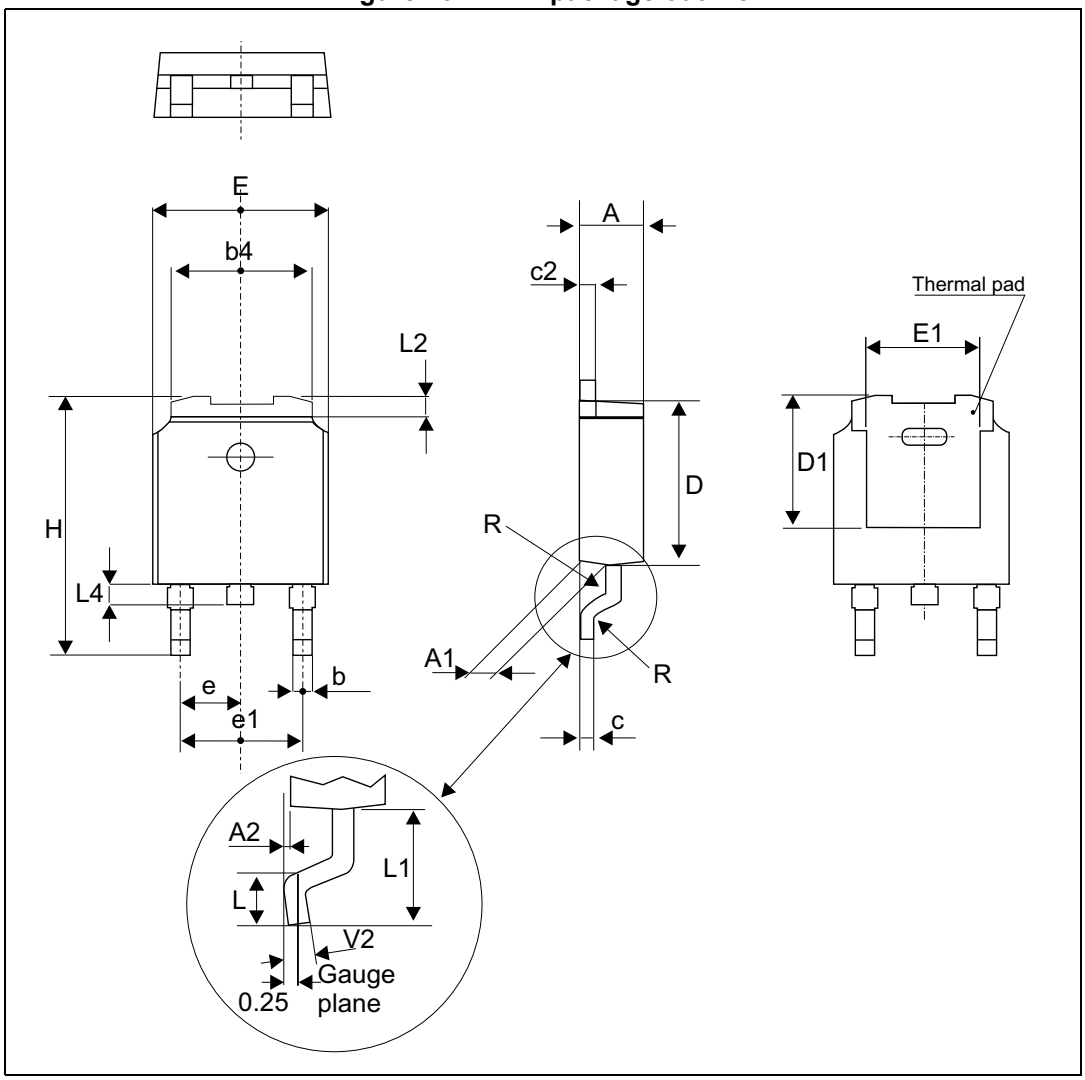
2 Package Information

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

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 DPAK package information

Figure 16. DPAK package outline

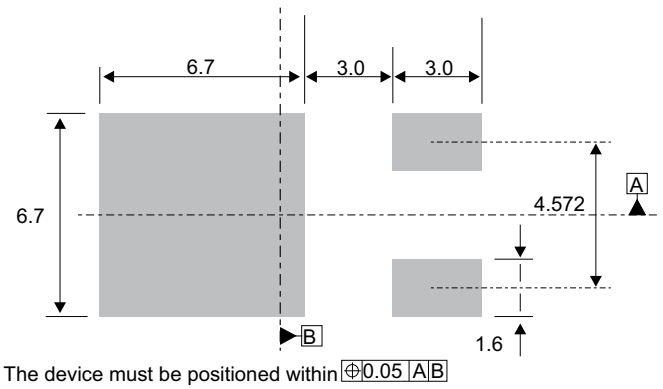


Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 5. DPAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	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		0.214
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		0.264
E1	4.32		5.50	0.170		0.216
e		2.28			0.090	
e1	4.40		4.70	0.173		0.185
H	9.35		10.40	0.368		0.409
L	1.00		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 17. DPAK footprint dimensions (in mm)



2.2 SMBflat package information

Figure 18. SMBflat package outline

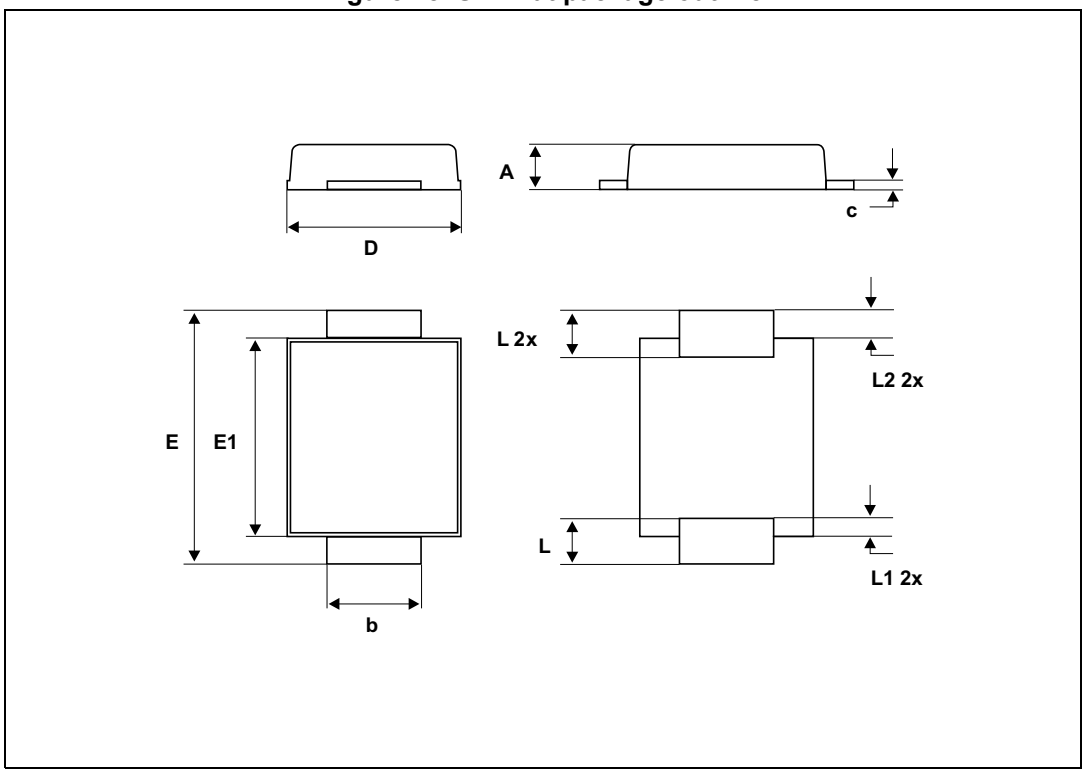
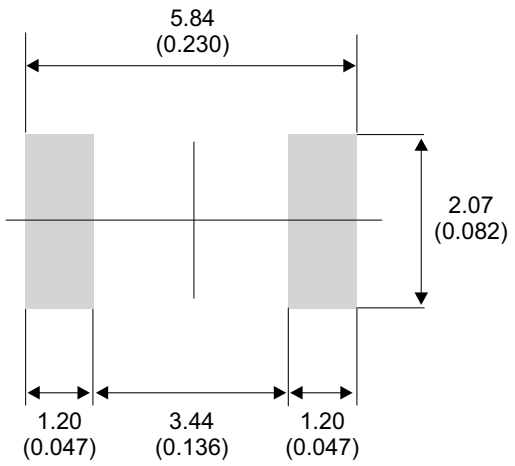


Table 6. SMBflat package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	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		0.155
E	5.10		5.60	0.200		0.220
E1	4.05		4.60	0.159		0.181
L	0.75		1.50	0.029		0.059
L1		0.40			0.016	
L2		0.60			0.024	

Figure 19. SMBflat footprint, dimensions in mm (inches)



2.3 SMB package information

Figure 20. SMB package outline

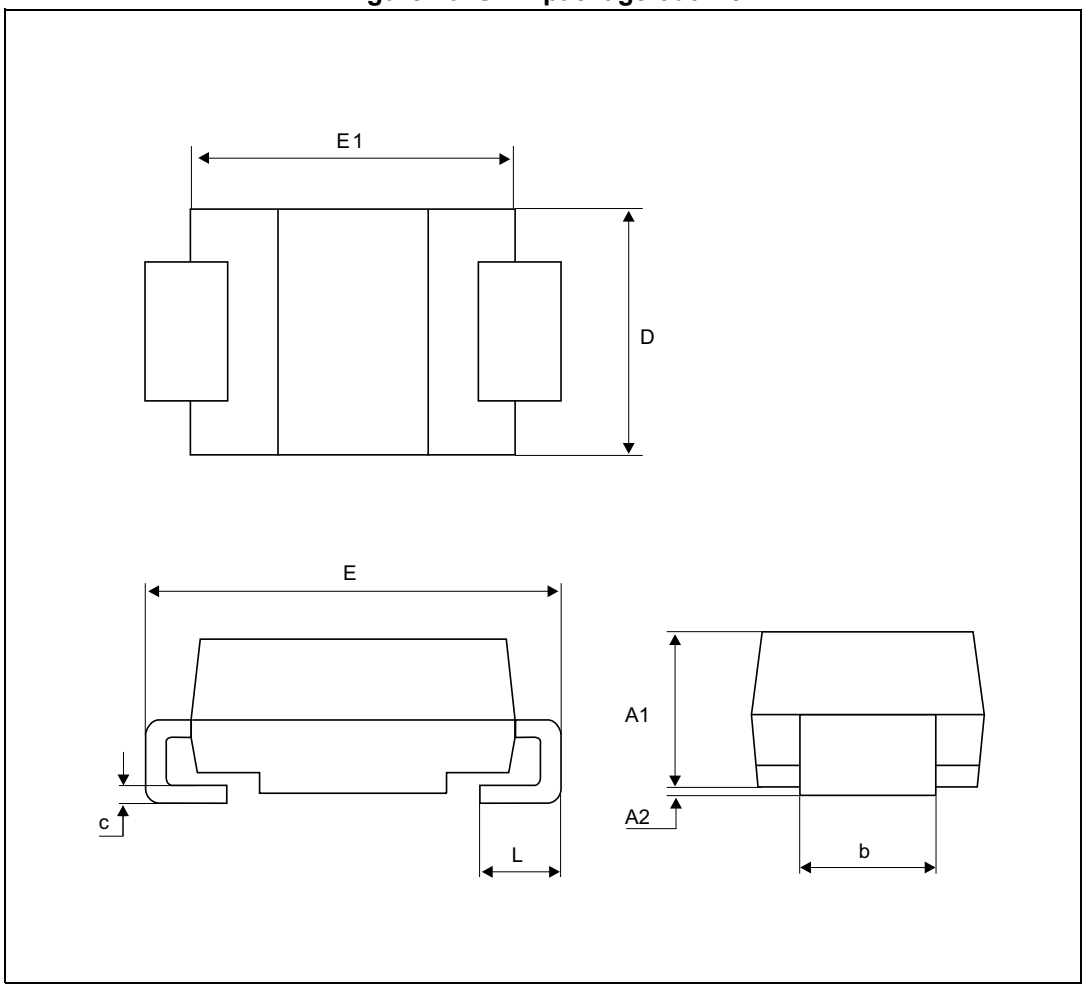
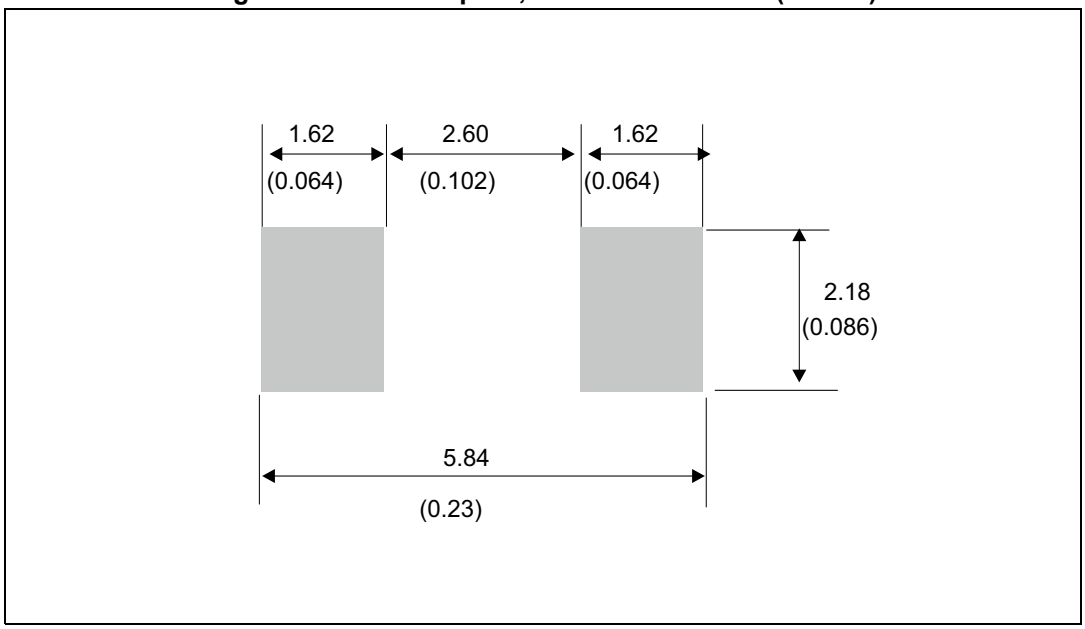


Table 7. SMB package mechanical data

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
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

Figure 21. SMB footprint, dimensions in mm (inches)



2.4 SMC package information

Figure 22. SMC package outline

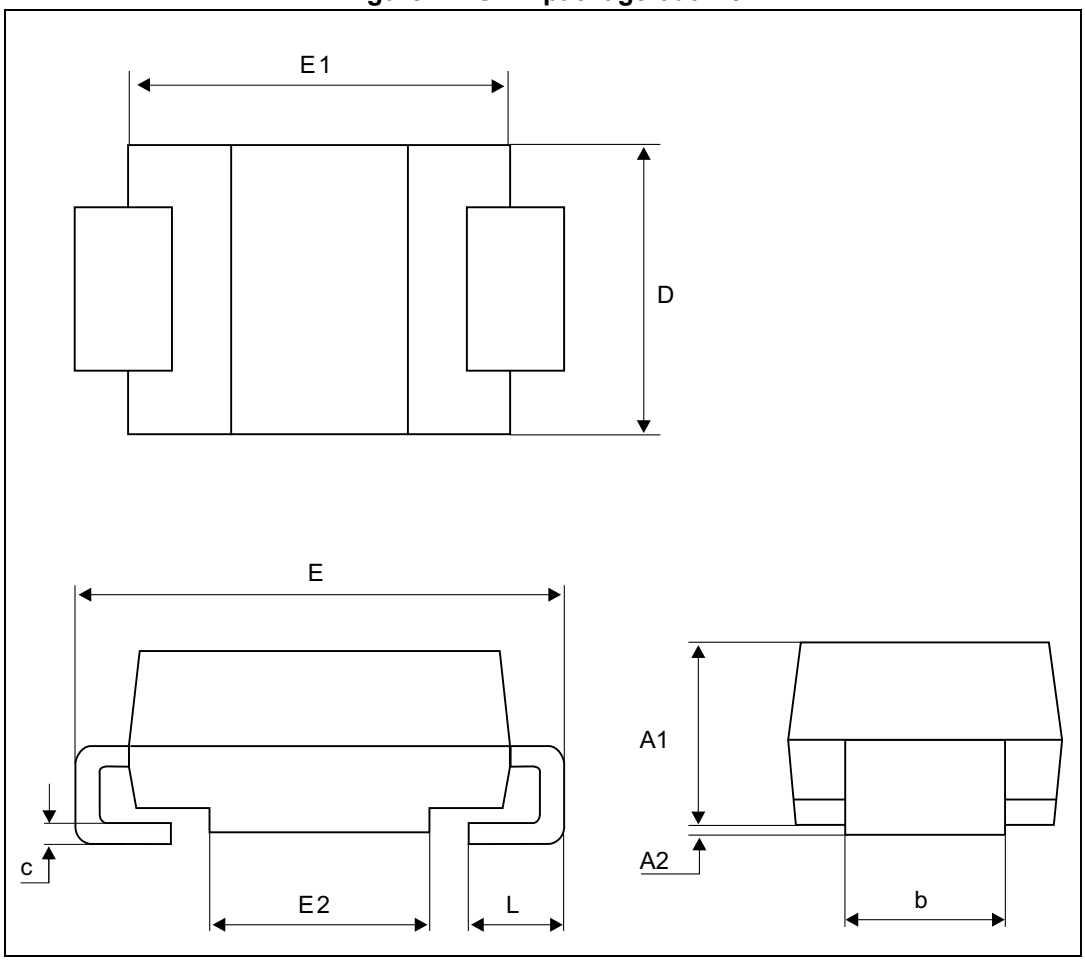
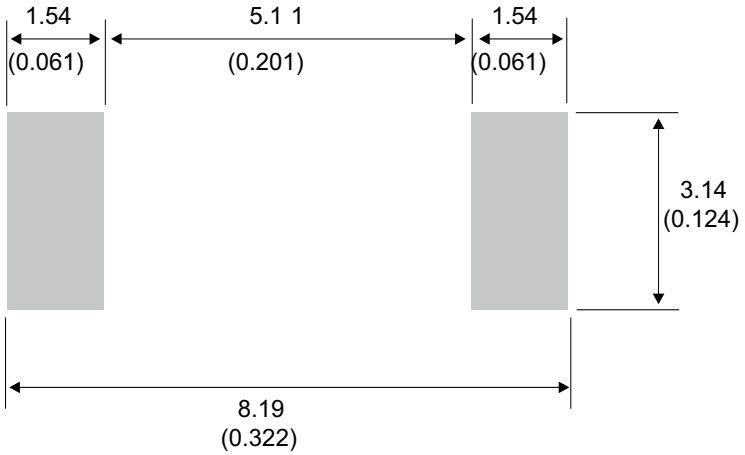


Table 8. SMC package mechanical data

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)	2.90	3.20	0.114	0.126
c(1)	0.15	0.40	0.006	0.016
D	5.55	6.25	0.218	0.246
E	7.75	8.15	0.305	0.321
E1	6.60	7.15	0.260	0.281
E2	4.40	4.70	0.173	0.185
L	0.75	1.50	0.030	0.059

1. Dimensions b and c apply to plated leads

Figure 23. SMC footprint, dimensions in mm (inches)



3 Ordering information

Table 9. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS340U	U34	SMB	107 mg	2500	Tape and reel
STPS340S	S34	SMC	243 mg		
STPS340B-TR	S3 40	DPAK	320 mg		
STPS340UF	FU34	SMBflat	50 mg	5000	

4 Revision history

Table 10. Revision history

Date	Revision	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.