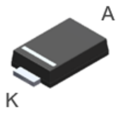
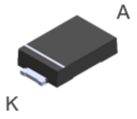
STPS4S200

Datasheet

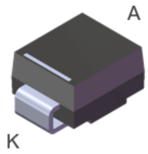
4 A - 200 V power Schottky rectifier



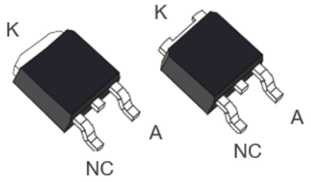
SMB Flat



SMB Flat Notch



SMC



DPAK

Features

- Negligible switching losses
- High junction temperature capability
- Very small conduction losses
- Low leakage current
- T_j = -40 °C minimum operating
- ECOPACK2 component

Applications

- Inverter
- Lighting
- Battery charger
- Telecom power
- Home appliance

Description

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

Packaged in SMB Flat Notch, SMB Flat, SMC and DPAK, the STPS4S200 is ideal for surface mounting and used in low voltage, high frequency inverters, free wheeling and polarity protection applications.

Product status
STPS4S200

Product summary	
Symbol	**Value**
$I_{F(AV)}$	4 A
V_{RRM}	200 V
$T_{j(max.)}$	175 °C
$V_{F(typ.)}$	0.64 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			200	V
$I_{F(RMS)}$	Forward rms current			10	A
$I_{F(AV)}$	Average forward current, δ = 0.5, square wave	SMB Flat Notch, SMC, SMB Flat	$T_L = 125$ °C	4	A
		DPAK	$T_c = 160$°C		
I_{FSM}	Surge non repetitive forward current		t_p = 10 ms sinusoidal	130	A
T_{stg}	Storage temperature range			-65 to +175	°C
T_j	Operating junction temperature range(1)			-40 to +175	°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 Notch, SMC, SMB Flat)		15	°C/W
$R_{th(j-c)}$	Junction to case	DPAK	3.2	

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	$V_R = V_{RRM}$	-		5	µA
		$T_j = 125$ °C		-	0.70	2.50	mA
V_F(2)	Forward voltage drop	$T_j = 25$ °C	$I_F = 4$ A	-		0.87	V
		$T_j = 125$ °C		-	0.64	0.71	

1. *Pulse test: $t_p = 5$ ms, $\delta < 2\%$*
2. *Pulse test: $t_p = 380$ µs, $\delta < 2\%$*

To evaluate the conduction losses, use the following equation:

$P = 0.63 \times I_{F(AV)} + 0.020 \times I_{F}^{2}{}_{(RMS)}$

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

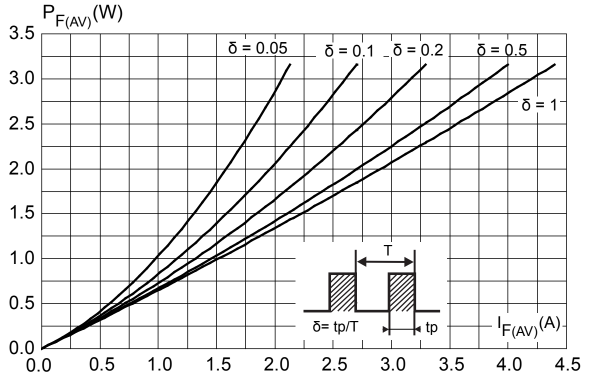


Figure 2. Average forward current versus ambient temperature (δ = 0.5)

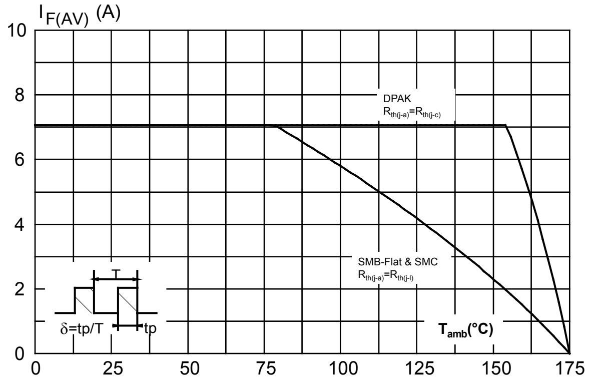


Figure 3. Normalized avalanche power derating versus pulse duration (T_j = 125 °C)

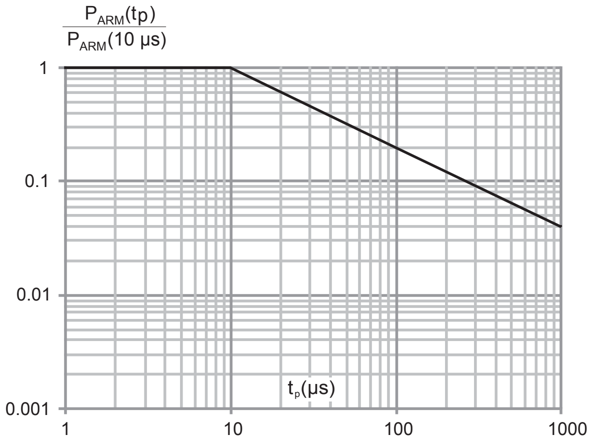


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration (DPAK)

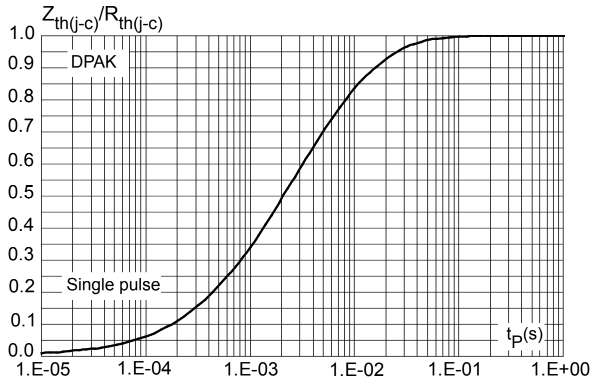


Figure 5. Relative variation of thermal impedance junction to lead versus pulse duration (SMB flat, SMB flat Notch)

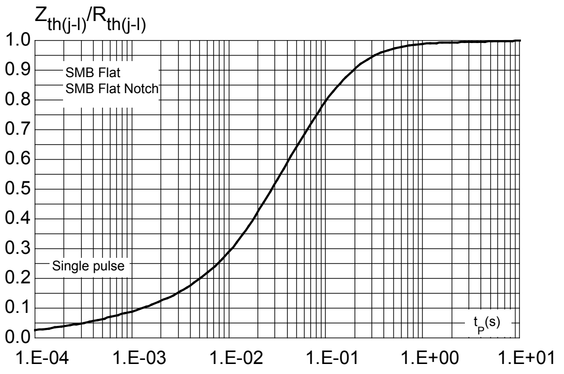


Figure 6. Relative variation of thermal impedance junction to lead versus pulse duration (SMC)

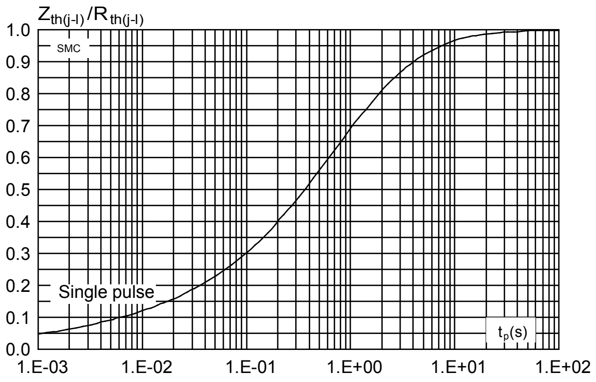


Figure 7. Reverse leakage current versus reverse voltage applied (typical values)

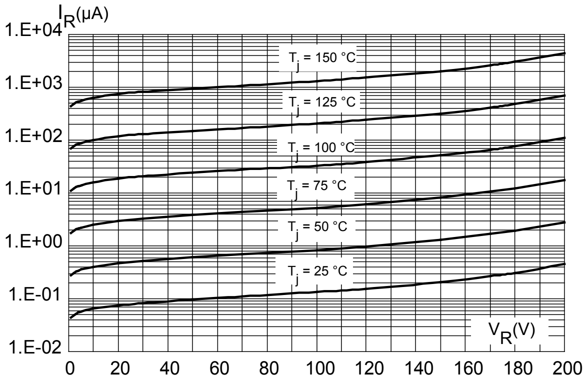


Figure 8. Junction capacitance versus reverse voltage applied (typical values)

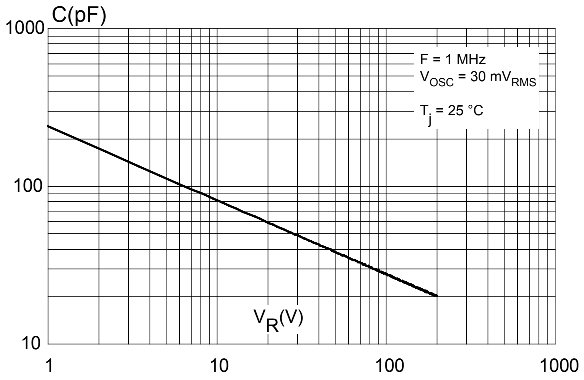


Figure 9. Forward voltage drop versus forward current (typical values)

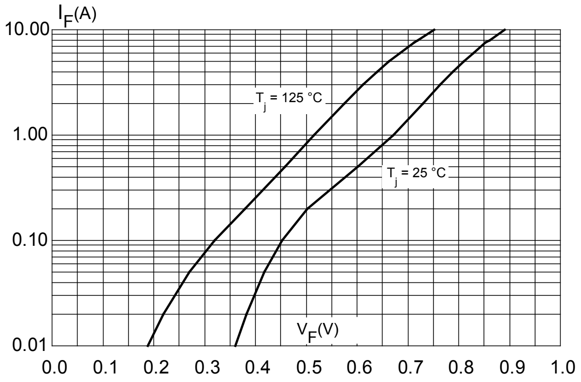


Figure 10. Forward voltage drop versus forward current (maximum values)

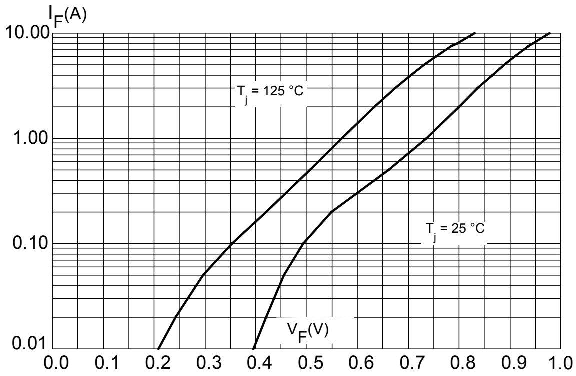


Figure 11. Thermal resistance junction to ambient versus copper surface under tab (DPAK)

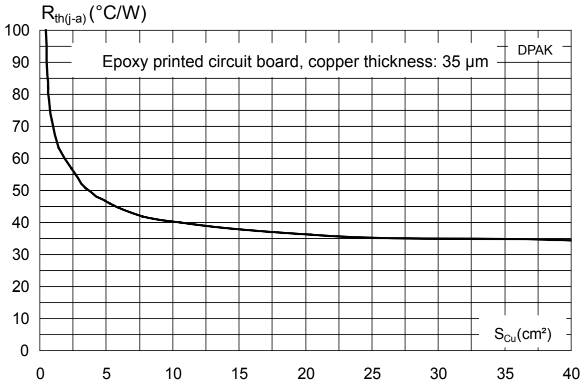


Figure 12. Thermal resistance junction to ambient versus copper surface under each lead (SMB Flat, SMB Flat Notch)

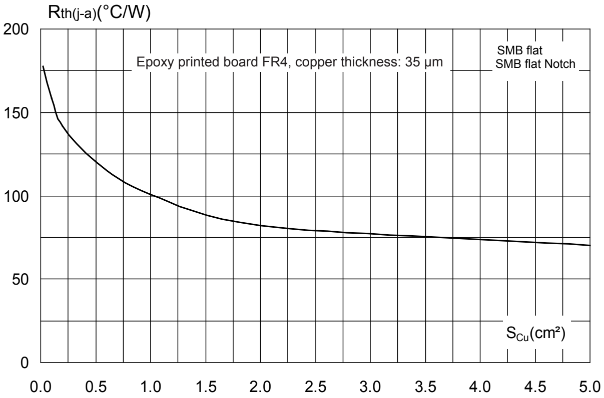
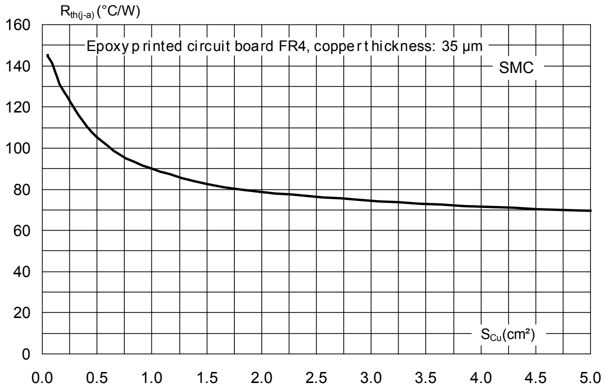


Figure 13. Thermal resistance junction to ambient versus copper surface under each lead (SMC)



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 Flat Notch package information

- Epoxy meets UL94, V0
- Lead-free package

Figure 14. **SMB Flat Notch package outline**

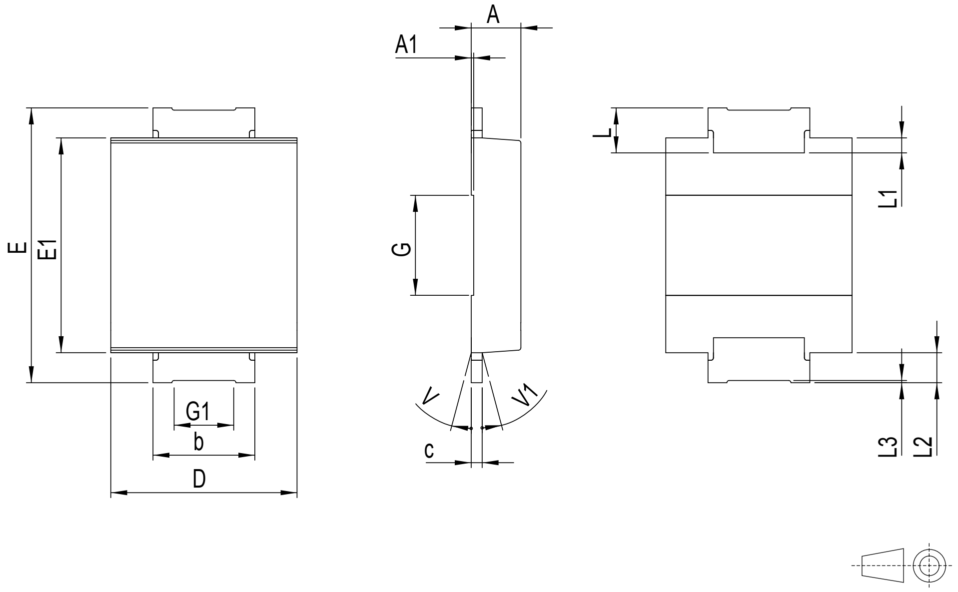
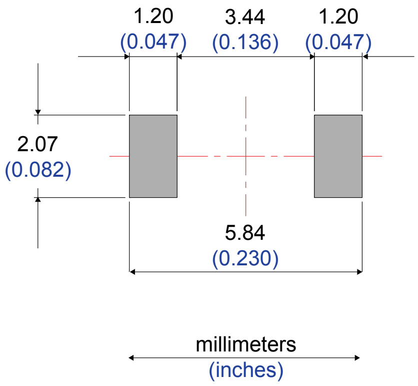


Table 4. **SMB Flat Notch mechanical data**

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.90		1.10	0.035		0.043
A1		0.05			0.002	
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	5.20		5.60	0.205		0.220
E1	4.05		4.60	0.159		0.181
G		2.00			0.079	
G1		1.20			0.047	
L	0.75		1.20	0.030		0.047
L1		0.30			0.012	
L2		0.60			0.024	
L3	0.02			0.001		
V			8°			8°
V1			8°			8°

Figure 15. Footprint recommendations, dimensions in mm (inches)



2.2 SMB Flat package information

- Epoxy meets UL94, V0
- Lead-free package

Figure 16. SMB Flat package outline

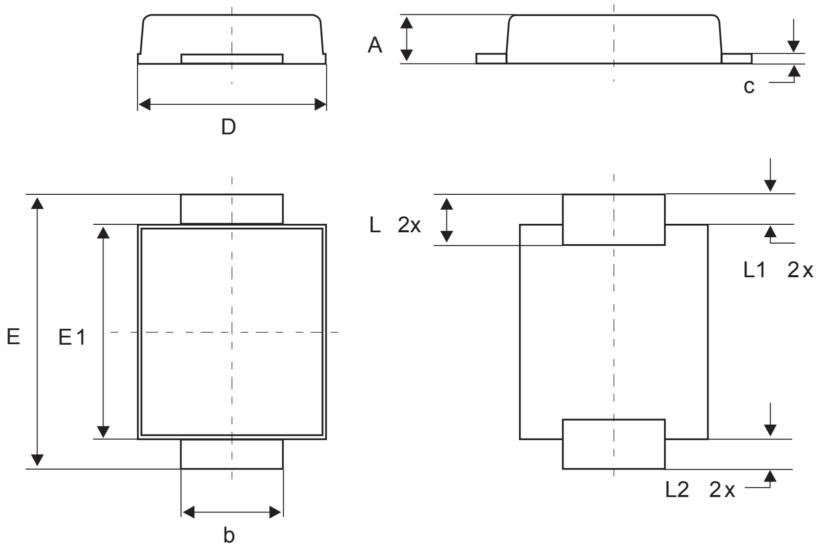
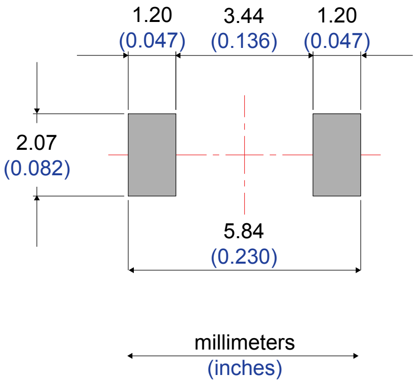


Table 5. SMB Flat mechanical data

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 17. Footprint recommendations, dimensions in mm (inches)



2.3 SMC package information

- Epoxy meets UL94, V0

Figure 18. SMC package outline

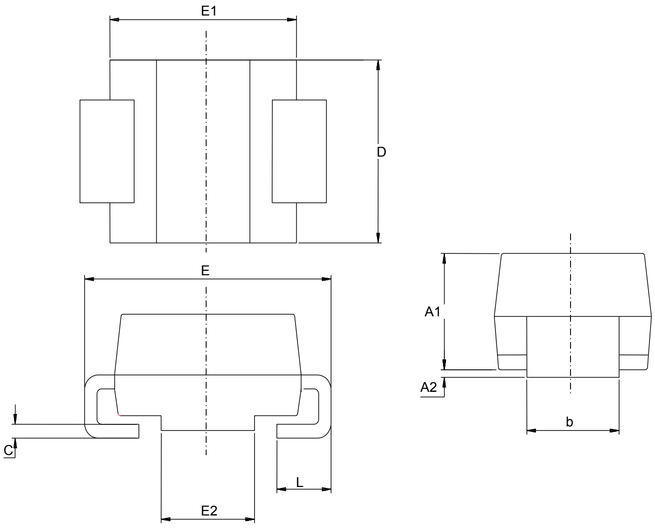
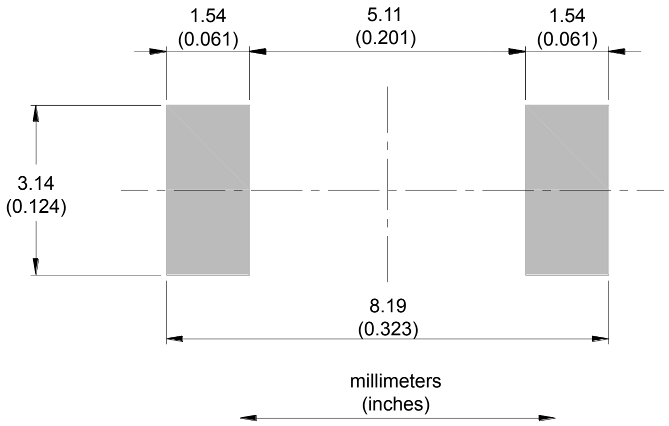


Table 6. SMC package mechanical data

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

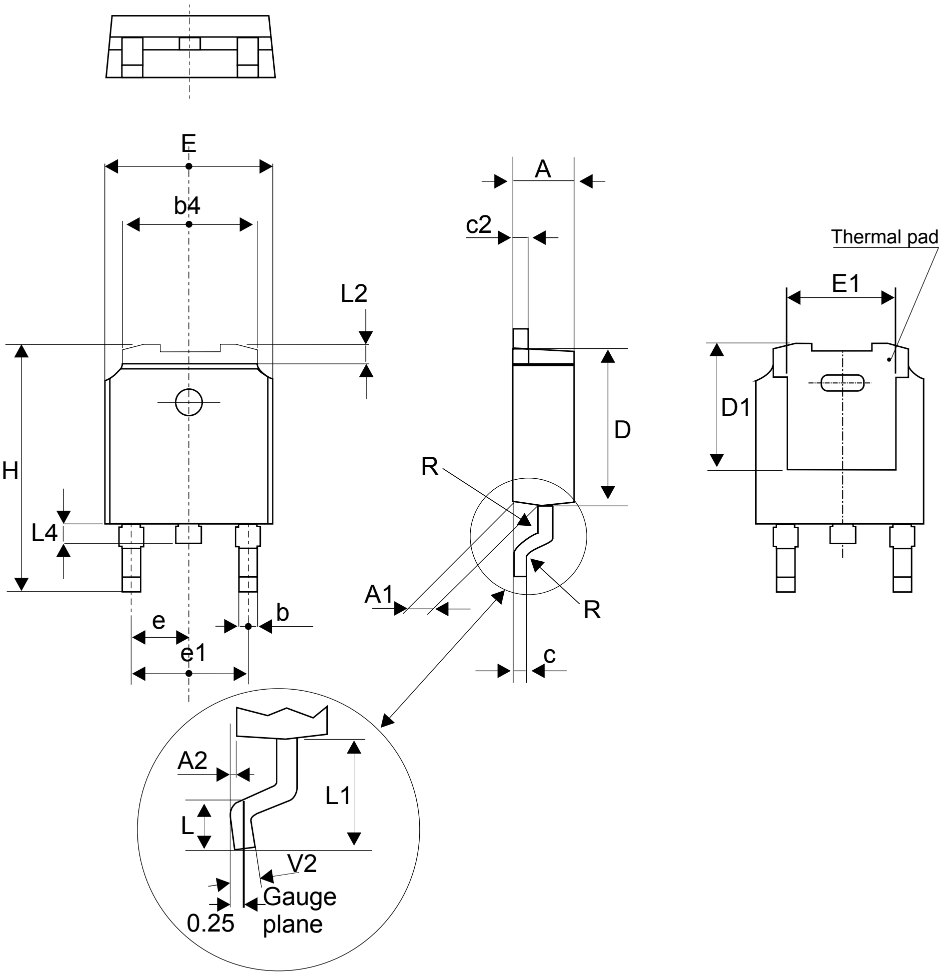
Figure 19. SMC recommended footprint



2.4 DPAK package information

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

Figure 20. **DPAK package outline**

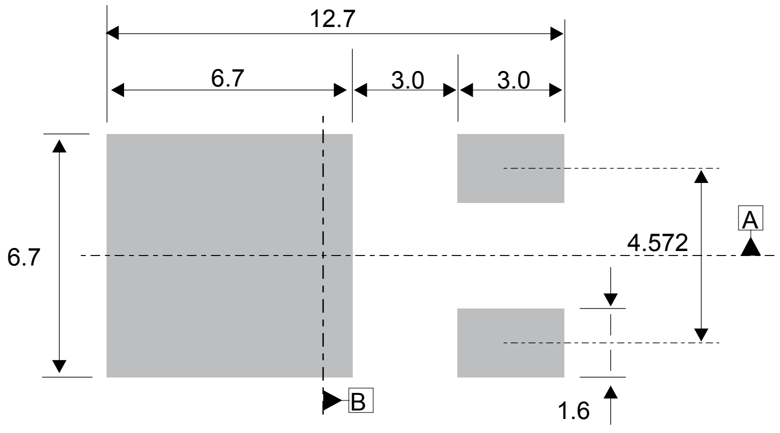


Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 7. **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 21. **DPAK recommended footprint (dimensions in mm)**



The device must be positioned within ⌖ 0.05 | A | B

3 Ordering information

Table 8. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS4S200B-TR	S4 200B	D^2PAK	0.032 g	10 000	Tape and reel
STPS4S200S	S42	SMC	0.250 g	2500	Tape and reel
STPS4S200UF	FG42	SMB Flat	0.050 g	5000	Tape and reel
STPS4S200UFN	B42	SMB Flat Notch	0.056 g	5000	Tape and reel

Revision history

Table 9. **Document revision history**

Date	Version	Changes
17-Oct-2014	1	First release.
26-Aug-2015	2	Added device in SMC package. Updated document accordingly.
15-May-2017	3	Updated DPAK package information and reformatted to current standard.
31-Jan-2019	4	Added Section 2.1 SMB Flat Notch package information.

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