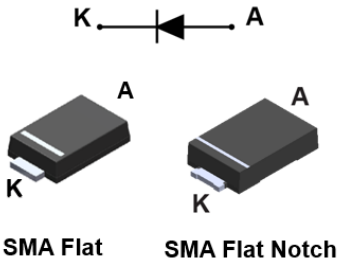
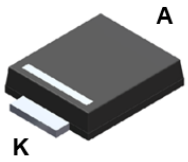
STPS3170

Datasheet

170 V, 3 A power Schottky rectifier



SMA Flat SMA Flat Notch



SMB Flat

Features

- Negligible switching losses
- High junction temperature capability
- Very small conduction losses
- Low leakage current
- Avalanche rated
- ECOPACK2 component

Applications

- Switching diode
- SMPS
- DC / DC converter
- Telecom power

Description

The STPS3170 is a 170 V Schottky rectifier suited for switch mode power supplies and high frequency DC to DC converters.

Packaged in SMA Flat, SMA Flat Notch and SMB Flat, the STPS3170 is ideal for use in low voltage, high frequency inverters, freewheeling and polarity protection. Also ideal for all LED lighting applications where efficiency and space constraint are required.

Product status
STPS3170

Product summary	
Symbol	Value
$I_{F(AV)}$	3 A
V_{RRM}	170 V
$T_{j(max.)}$	175 °C
$V_{F(typ.)}$	0.63 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			170	V
V_{RRM}	Repetitive peak reverse voltage, T_j = -40 °C			160	V
$I_{F(RMS)}$	Forward rms current			15	A
$I_{F(AV)}$	Average forward current, δ = 0.5, square wave	SMA Flat, SMA Flat Notch	T_L = 130 °C	3	A
		SMB Flat	T_L = 140 °C		
I_{FSM}	Surge non repetitive forward current	SMA Flat, SMA Flat Notch	t_p = 10 ms sinusoidal	75	A
		SMB Flat		80	
P_{ARM}	Repetitive peak avalanche power		t_p = 10 µs, T_j = 125 °C	210	W
T_{stg}	Storage temperature range			-65 to +175	°C
T_j	Maximum operating junction temperature(1)			+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	SMA Flat, SMA Flat Notch	20	°C/W
		SMB Flat	15	

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	$V_R = V_{RRM}$	-		4.0	µA
		T_j = 125 °C		-	0.73	4.0	mA
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 3 A	-		0.82	V
		T_j = 125 °C		-	0.63	0.67	
		T_j = 25 °C	I_F = 6 A	-		0.89	
		T_j = 125 °C		-	0.70	0.75	

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: $P = 0.59 \times I_{F(AV)} + 0.027 \times I_F{}^2{}_{(RMS)}$

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

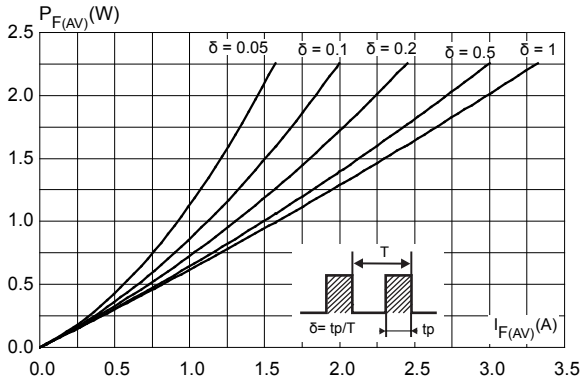


Figure 2. Average forward current versus ambient temperature (δ = 0.5)

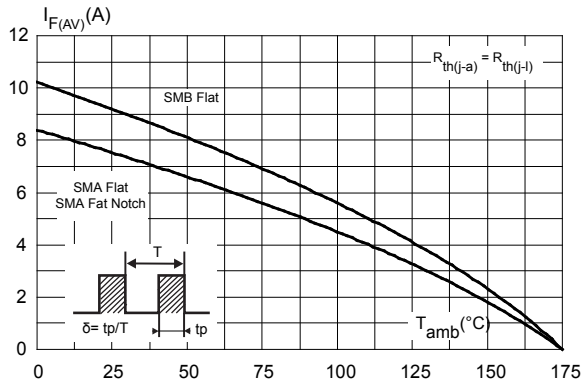


Figure 3. Relative variation of thermal impedance junction to lead versus pulse duration

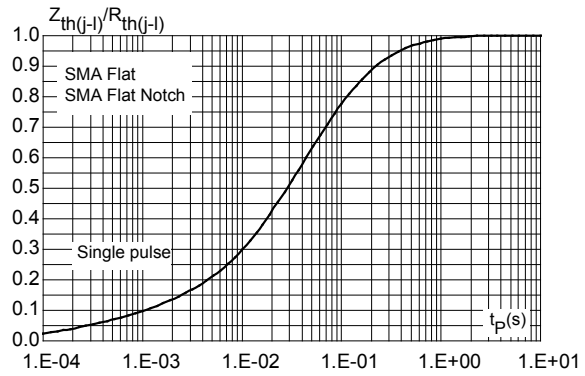


Figure 4. Relative variation of thermal impedance junction to lead versus pulse duration

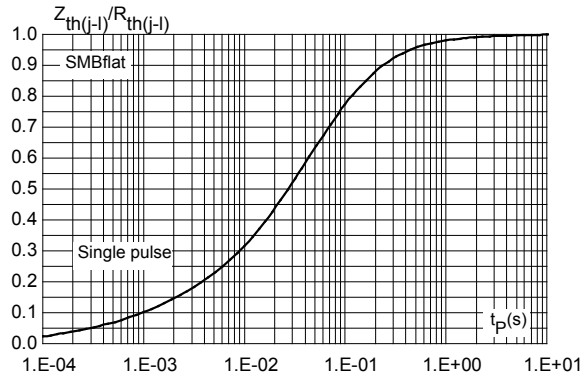


Figure 5. Reverse leakage current versus reverse voltage applied (typical values)

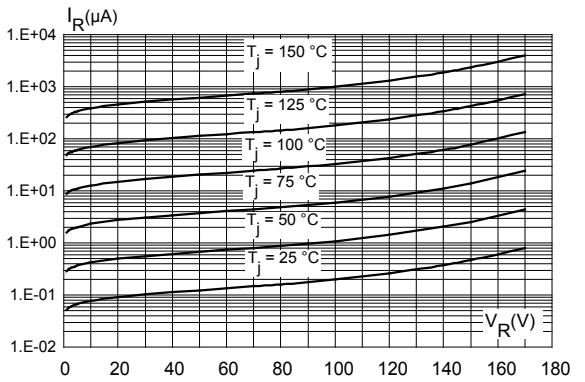


Figure 6. Junction capacitance versus reverse voltage applied (typical values)

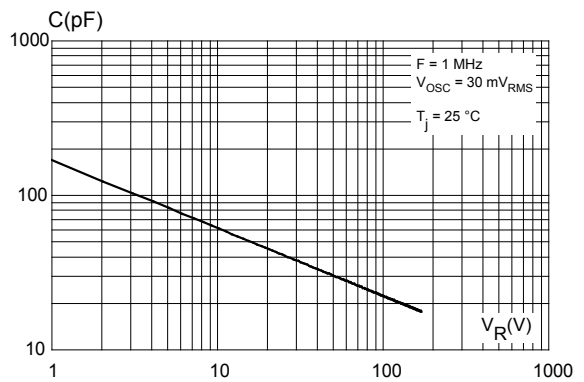


Figure 7. Forward voltage drop versus forward current (typical values)

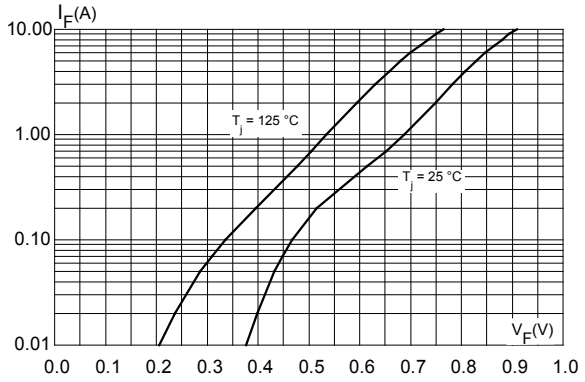


Figure 8. Forward voltage drop versus forward current (maximum values)

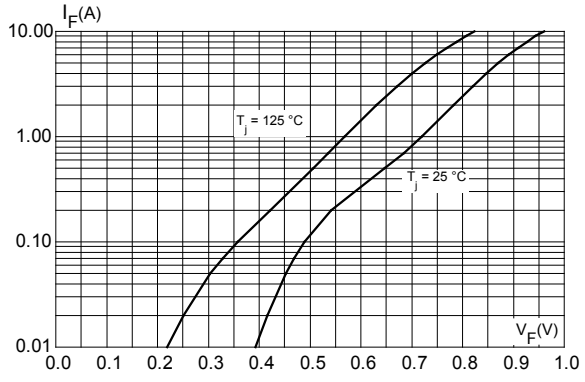


Figure 9. Thermal resistance junction to ambient versus copper surface under each lead (SMB Flat)

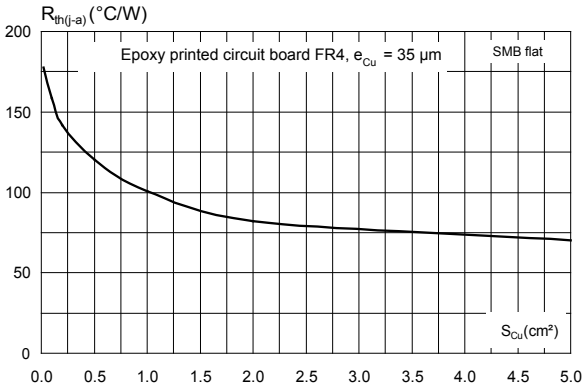


Figure 10. Thermal resistance junction to ambient versus copper surface under each lead (SMA Flat, SMA Flat Notch)

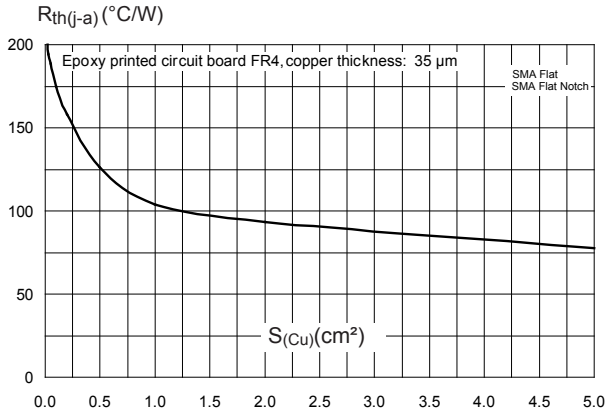
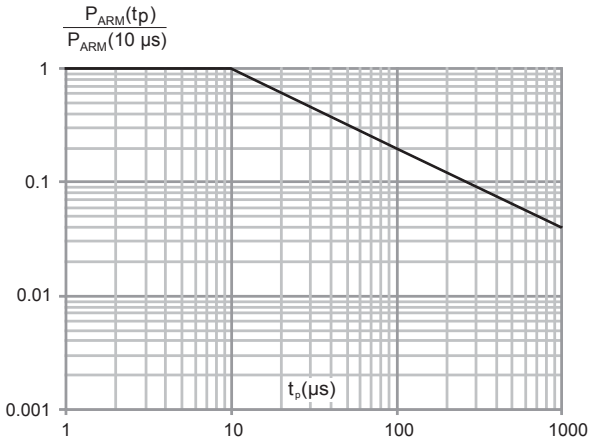


Figure 11. Normalized avalanche power derating versus pulse duration (T_j = 125 °C)



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 package information

- Epoxy meets UL94, V0
- Lead-free package

Figure 12. SMB Flat package outline

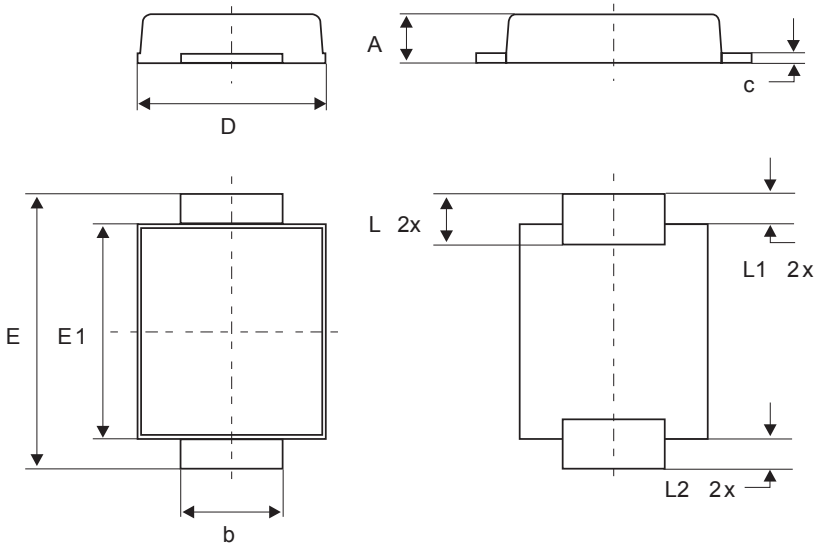
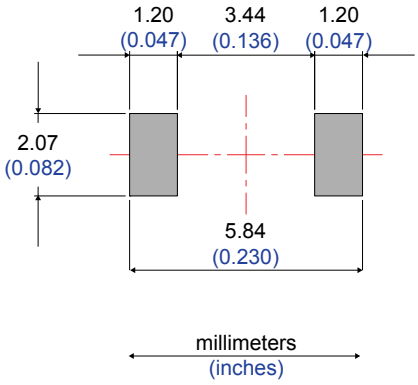


Table 4. SMB Flat mechanical data

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 13. Footprint recommendations, dimensions in mm (inches)



2.2 SMA Flat package information

- Epoxy meets UL94, V0
- Lead-free package

Figure 14. SMA Flat package outline

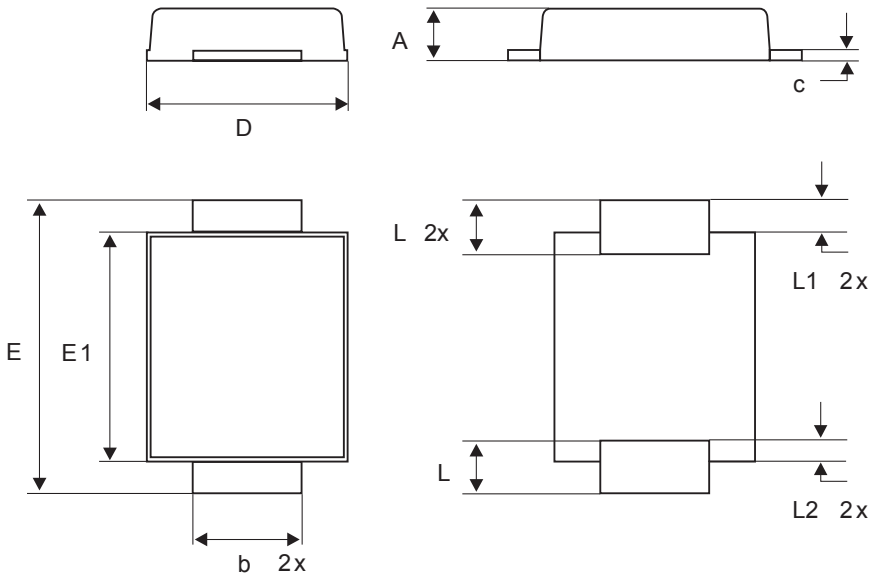
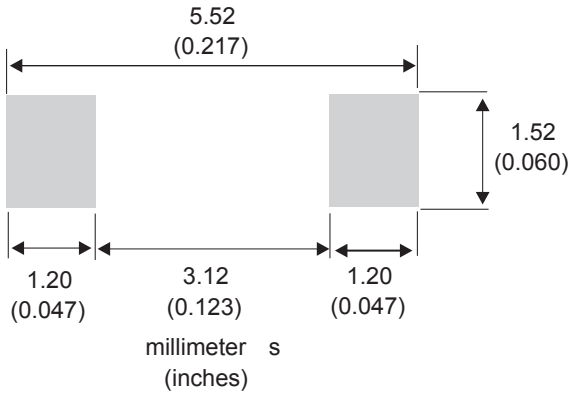


Table 5. SMA Flat package mechanical data

Ref.	Dimensions					
	Millimeters			Inches (for reference only)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.90		1.10	0.035		0.044
b	1.25		1.65	0.049		0.065
c	0.15		0.40	0.005		0.016
D	2.25		2.95	0.088		0.117
E	4.80		5.60	0.188		0.221
E1	3.95		4.60	0.155		0.182
L	0.75		1.50	0.029		0.060
L1		0.50			0.020	
L2		0.50			0.020	

Figure 15. **SMA Flat recommended footprint in mm (inches)**



2.3 SMA Flat Notch package information

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

Figure 16. SMA Flat Notch package outline

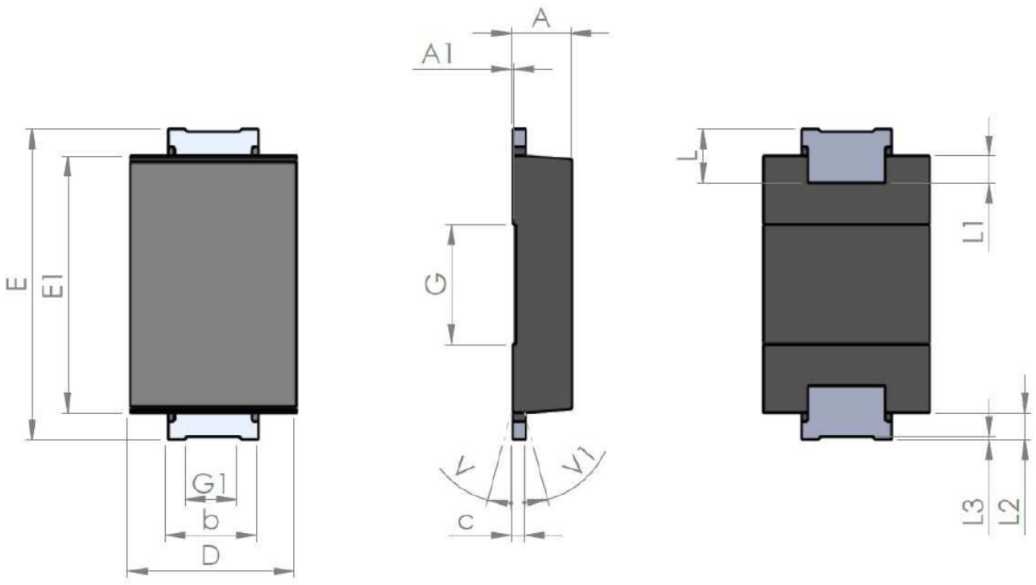
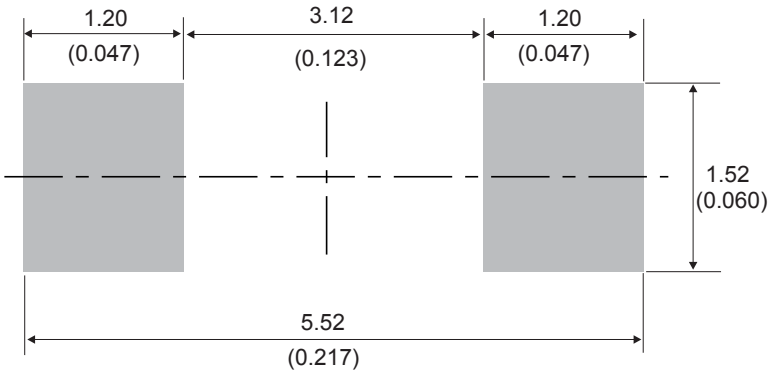


Table 6. SMA Flat Notch package mechanical data

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 17. **SMA Flat Notch recommended footprint in mm (inches)**



3 Ordering information

Table 7. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS3170AF	F317	SMA Flat	0.035 g	10 000	Tape and reel
STPS3170AFN	A3170	SMA Flat Notch	0.039 g	10 000	Tape and reel
STPS3170UF	FG317	SMB Flat	0.050 g	5000	Tape and reel

Revision history

Table 8. **Document revision history**

Date	Version	Changes
17-Oct-2014	1	First release.
08-Oct-2019	2	Added Section 2.3 SMA Flat Notch package information.