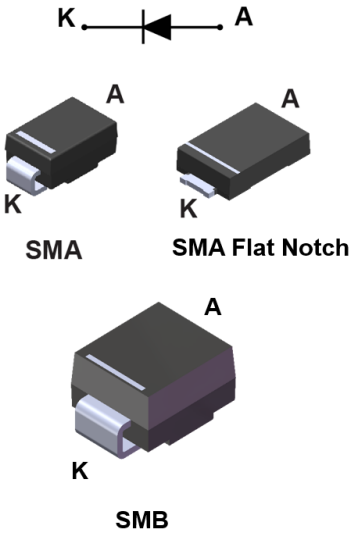
STPS160

Datasheet

60 V, 1 A power Schottky rectifier



Features

- Very small conduction losses
- Negligible switching losses
- Low forward voltage drop
- Surface mount miniature packages
- Avalanche capability specified
- ECOPACK2 compliant

Applications

- Lighting
- Battery charger
- DC / DC converter
- Notebook adapter
- Switching diode

Description

Single Schottky rectifiers designed for high frequency miniature switched mode power supplies such as adaptors and on board DC/DC converters.

Packaged in SMA, SMA Flat Notch or SMB, the STPS160 is ideal for use in parallel with MOSFETs in synchronous and low voltage secondary rectification.

Product status
STPS160

Product summary	
Symbol	Value
$I_{F(AV)}$	1 A
V_{RRM}	60 V
$T_{j(max.)}$	150 °C
$V_{F(typ.)}$	0.49 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			60	V
$I_{F(AV)}$	Average forward current, δ = 0.5, square wave	SMA	T_L = 130 °C	1	A
		SMA Flat Notch, SMB	T_L = 135 °C		
I_{FSM}	Surge non repetitive forward current	SMA, SMB	t_p = 10 ms sinusoidal	75	A
		SMA Flat Notch		100	
P_{ARM}	Repetitive peak avalanche power		t_p = 10 µs, T_j = 125 °C	180	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	30	°C/W
		SMA Flat Notch	20	
		SMB	23	

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	µA
		T_j = 125 °C		-	1.1	4	mA
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 1 A	-		0.67	V
		T_j = 125 °C		-	0.49	0.57	
		T_j = 25 °C	I_F = 2 A	-		0.8	
		T_j = 125 °C		-	0.58	0.65	

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:

$P = 0.49 \times I_{F(AV)} + 0.08 \times I_F{}^2{}_{(RMS)}$

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

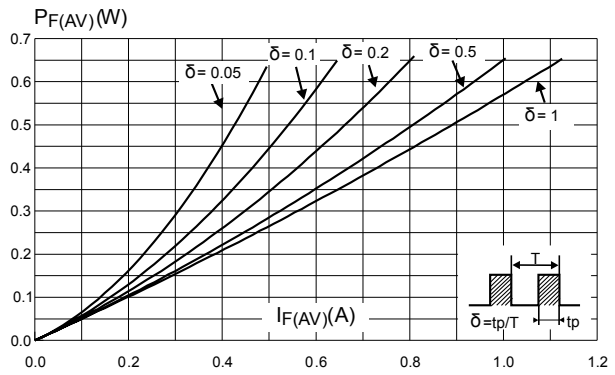


Figure 2. Average forward current versus ambient temperature (δ = 0.5)

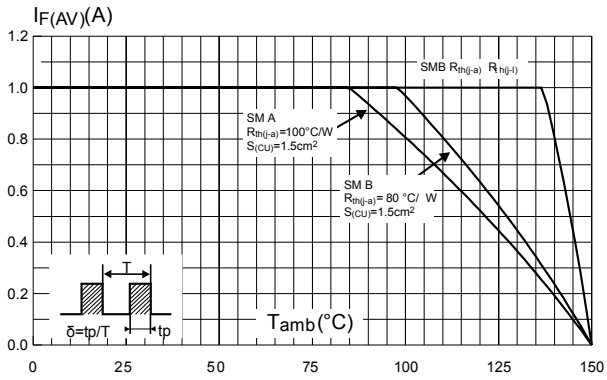


Figure 3. Normalized avalanche power derating versus pulse duration (T_j = 125 °C)

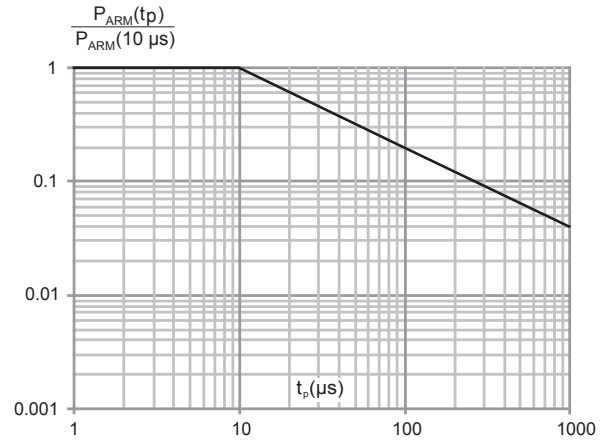


Figure 4. Relative variation of thermal impedance junction to ambient versus pulse duration (SMB)

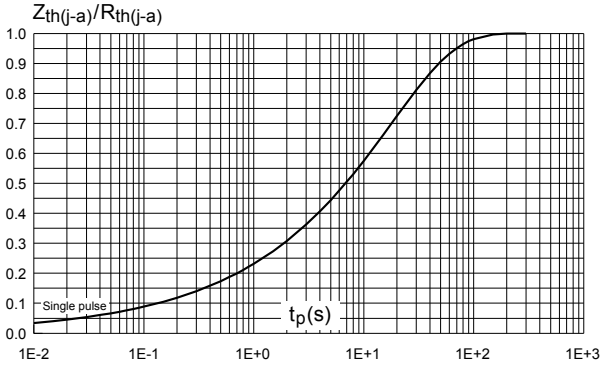


Figure 5. Relative variation of thermal impedance junction to ambient versus pulse duration (SMA)

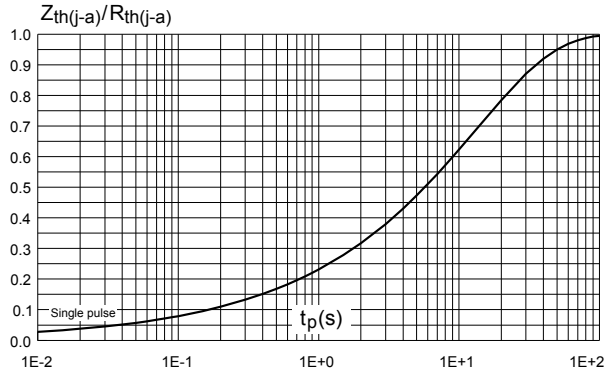


Figure 6. Reverse leakage current versus reverse voltage applied (typical values)

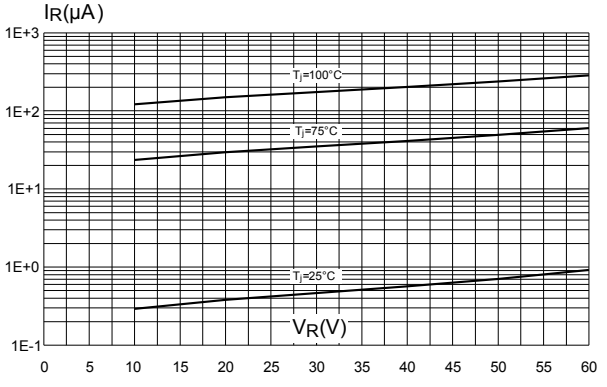


Figure 7. Junction capacitance versus reverse voltage applied (typical values)

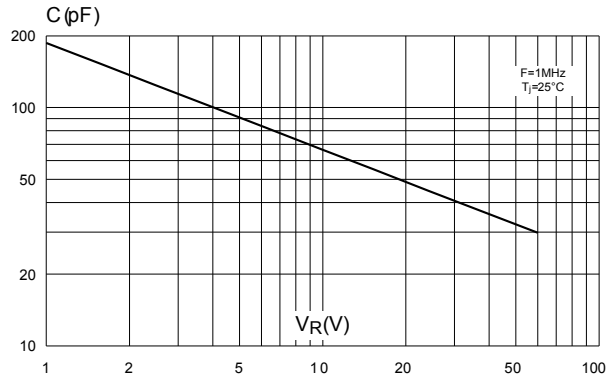


Figure 8. Forward voltage drop versus forward current (maximum values)

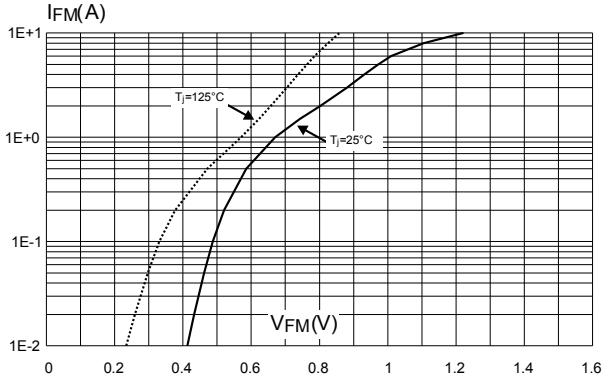


Figure 9. Thermal resistance junction to ambient versus copper surface under each lead (SMB)

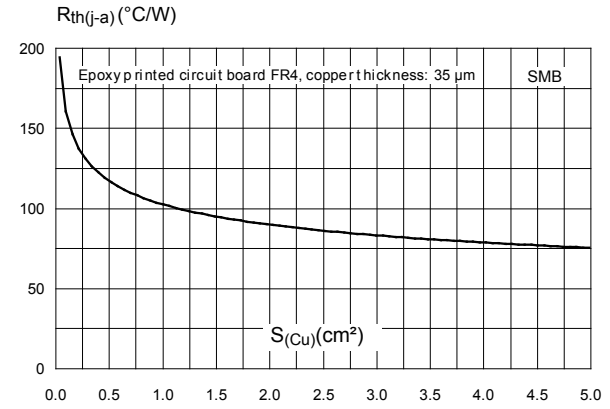


Figure 10. Thermal resistance junction to ambient versus copper surface under each lead (SMA)

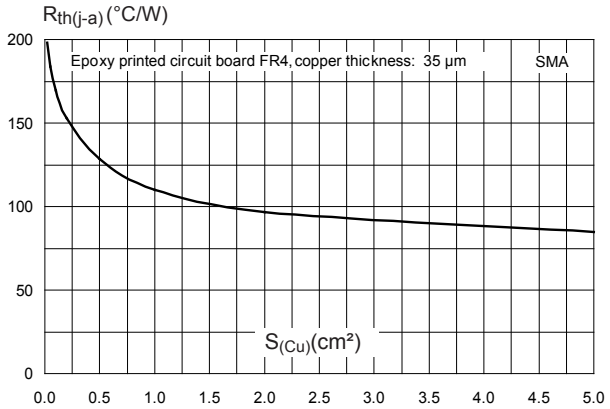
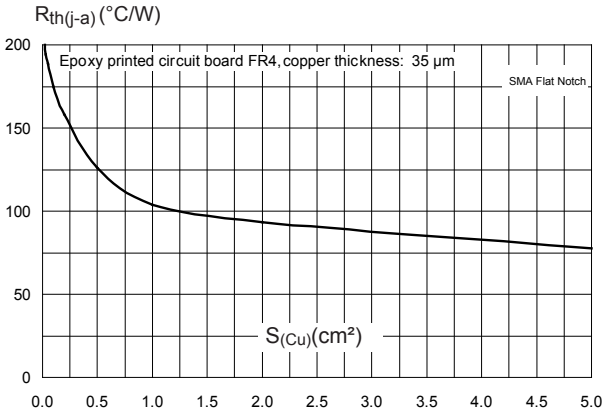


Figure 11. Thermal resistance junction to ambient versus copper surface under each lead (SMA Flat Notch)



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 package information

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

Figure 12. SMA package outline

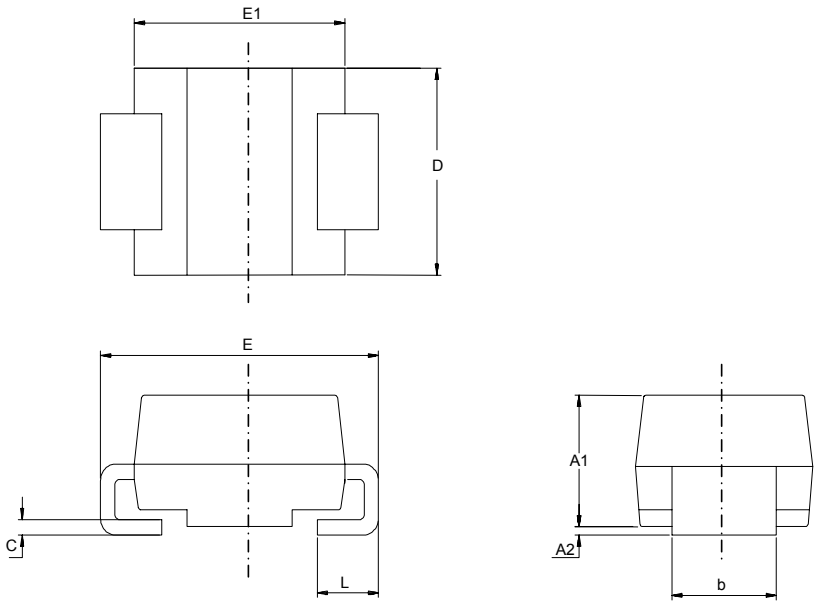
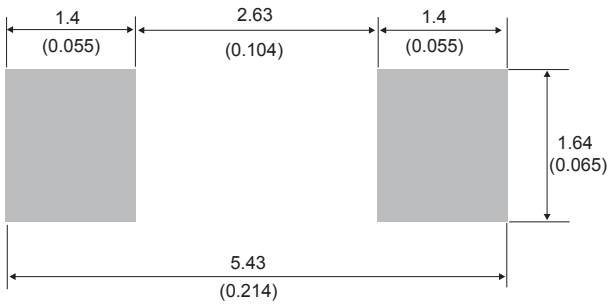


Table 4. SMA package mechanical data

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	1.25	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	4.80	5.35	0.188	0.211
E1	3.95	4.60	0.155	0.182
L	0.75	1.50	0.029	0.060

Figure 13. **SMA recommended footprint in mm (inches)**



2.2 SMA Flat Notch package information

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

Figure 14. SMA Flat Notch package outline

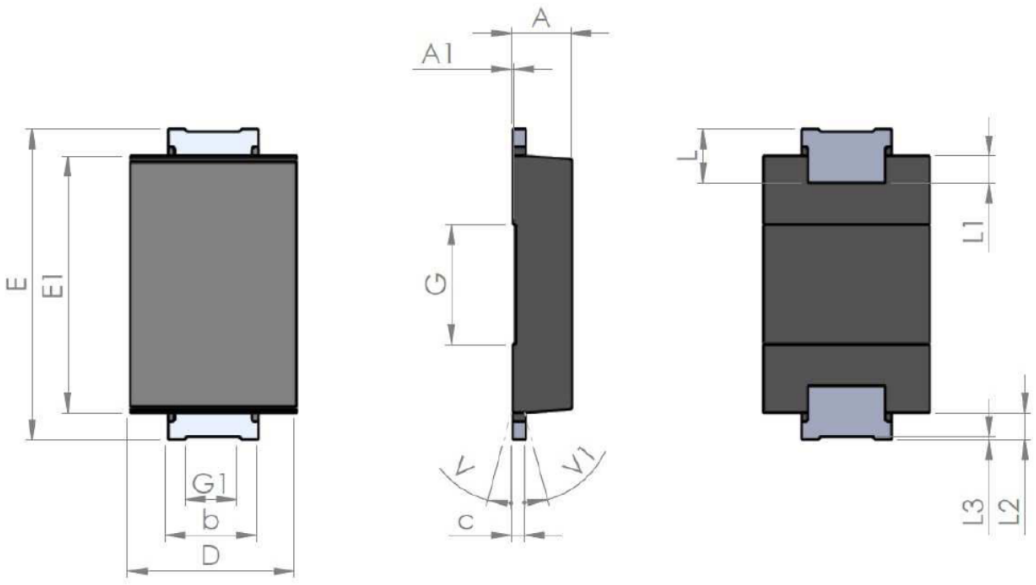
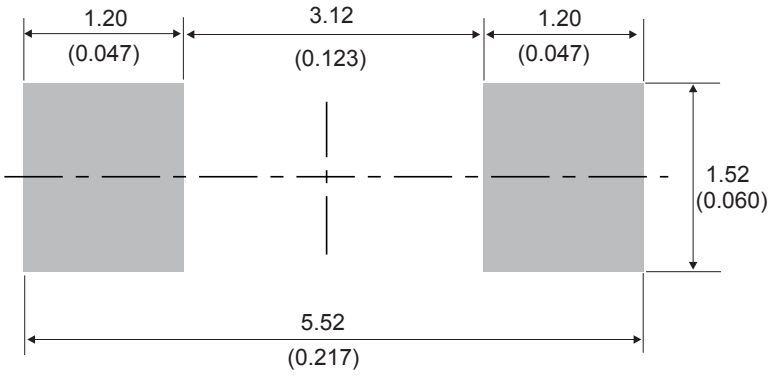


Table 5. SMA Flat Notch package mechanical data

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



2.3 SMB package information

- Epoxy meets UL94, V0
- Lead-free package

Figure 16. SMB package outline

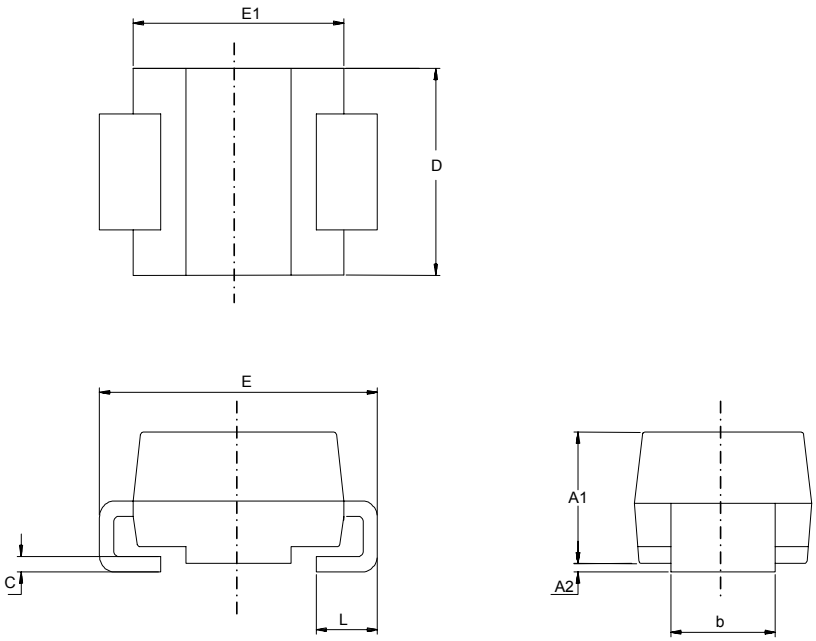
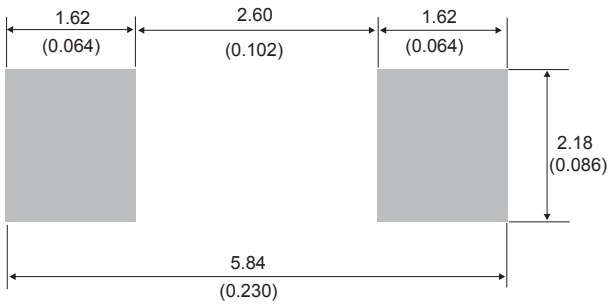


Table 6. SMB package mechanical data

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

Figure 17. **SMB recommended footprint**



3 Ordering Information

Table 7. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS160A	GA6	SMA	0.068 g	5000	Tape and reel
STPS160AFN	A160	SMA Flat Notch	0.039 g	10 000	Tape and reel
STPS160U	E16	SMB	0.107 g	2500	Tape and reel

Revision history

Table 8. **Document revision history**

Date	Version	Changes
Jul-2003	6A	Last update.
Aug-2004	7	SMA package dimensions update. Reference A1 max changed from 2.70 mm (0.106 inc.) to 2.03 mm (0.080 inc).
16-Feb-2007	8	Reformatted to current standards. IF(RMS) removed from Table 2. Package dimensions and footprints updated. Ecopack statement added.
18-Mar-2010	9	Updated package illustration on page 1.
08-Oct-2019	10	Added Section 2.2 SMA Flat Notch package information.