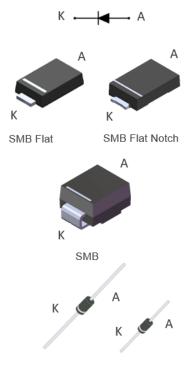


# 60 V, 3 A low drop Schottky rectifier



# DO-201AD DO-15 Product status STPS3L60

Product summary				
Symbol	Value			
I <sub>F(AV)</sub>	3 A			
V <sub>RRM</sub>	60 V			
T <sub>j(max.)</sub>	150 °C			
V <sub>F(typ.)</sub>	0.53 V			

#### **Features**

- Negligible switching losses
- Low forward voltage drop
- Avalanche rated
- ECOPACK2 component

#### **Applications**

- Switching diode
- SMPS
- · DC/DC converter
- LED lighting

#### **Description**

Axial and surface mount power Schottky rectifier suited for switch mode power supplies and high frequency dc to dc converters.

Packaged in DO-201AD, DO-15, SMB, SMBflat and SMBflat Notch, this device is intended for use in low voltage, high frequency inverters and small battery chargers and for applications where there are space constraints, for example telecom battery charger.



### 1 Characteristics

Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified)

Symbol	Р		Value	Unit	
V <sub>RRM</sub>	Repetitive peak reverse voltage				V
I <sub>F(RMS)</sub>	Forward rms current				Α
		SMB Flat Notch, SMB Flat	T <sub>L</sub> = 115 °C	3	
I <sub>F(AV)</sub>	Average forward current, $\delta$ = 0.5, square wave	SMB, DO-201AD	T <sub>L</sub> = 105 °C		Α
		DO-15	T <sub>L</sub> = 72 °C		
I <sub>FSM</sub>	Surge non repetitive forward current $t_p = 10 \text{ ms sinusoidal}$				Α
P <sub>ARM</sub>	Repetitive peak avalanche power $t_p$ = 10 $\mu$ s, $T_j$ = 125 $^{\circ}$ C			144	W
T <sub>stg</sub>	Storage temperature range				°C
Tj	Maximum operating junction temperature <sup>(1)</sup>				°C

<sup>1.</sup>  $(dP_{tot}/dT_j) < (1/R_{th(j-a)})$  condition to avoid thermal runaway for a diode on its own heatsink.

Table 2. Thermal resistance parameter

Symbol	Parameter	Max. value	Unit	
	Junction to leads	SMB Flat Notch, SMB Flat		
D	Junction to leads	SMB	20	°C/W
R <sub>th(j-l)</sub>	lunction to loads load langth = 10 mm	DO-201AD	20	C/VV
	Junction to leads, lead length = 10 mm	DO-15	35	

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.	Тур.	Max.	Unit
	I <sub>R</sub> <sup>(1)</sup> Reverse leakage current	T <sub>j</sub> = 25 °C		-		150	μA
I <sub>R</sub> <sup>(1)</sup>		T <sub>j</sub> = 100 °C	$V_R = V_{RRM}$		4	15	mA
		T <sub>j</sub> = 125 °C		-	14	30	
		T <sub>j</sub> = 25 °C	I <sub>F</sub> = 3 A	-		0.62	
		T <sub>j</sub> = 100 °C			0.53	0.61	
V <sub>F</sub> <sup>(1)</sup>	Fanyard valtage drap	T <sub>j</sub> = 125 °C		-	0.51	0.59	V
VF'	Forward voltage drop	T <sub>j</sub> = 25 °C	I <sub>F</sub> = 6 A	-		0.79	V
		T <sub>j</sub> = 100 °C			0.62	0.71	
		T <sub>j</sub> = 125 °C		-	0.6	0.69	

<sup>1.</sup> Pulse test:  $t_p$  = 380  $\mu$ s,  $\delta$  < 2%

DS2134 - Rev 7 page 2/17





To evaluate the conduction losses, use the following equation:

$$P = 0.44 \times I_{F(AV)} + 0.05 \times I_{F^{2}(RMS)}$$

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

DS2134 - Rev 7 page 3/17



#### 1.1 Characteristics (curves)

Figure 1. Average forward power dissipation versus average forward current

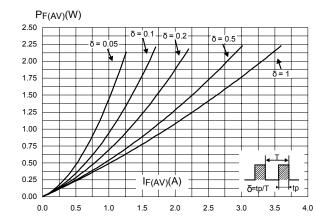


Figure 2. Average forward current versus ambient temperature ( $\delta$  = 0.5) (SMB Flat, SMB Flat Notch)

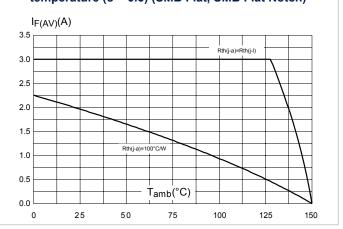


Figure 3. Average forward current versus ambient temperature ( $\delta$  = 0.5) (DO-201AD, SMB)

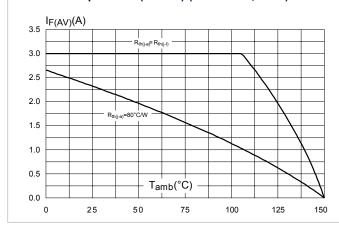


Figure 4. Average forward current versus ambient temperature ( $\delta$  = 0.5) (DO-15)

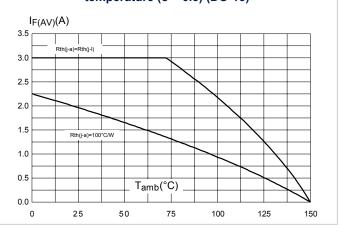


Figure 5. Normalized avalanche power derating versus pulse duration (T<sub>i</sub> = 125 °C)

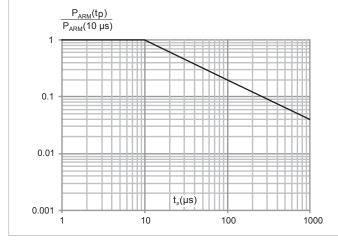
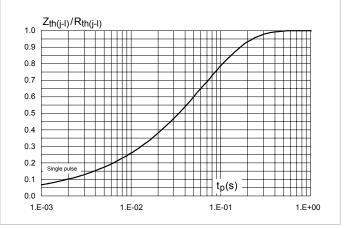


Figure 6. Relative variation of thermal impedance junction to lead versus pulse duration (SMB Flat, SMB Flat Notch)



DS2134 - Rev 7 page 4/17



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

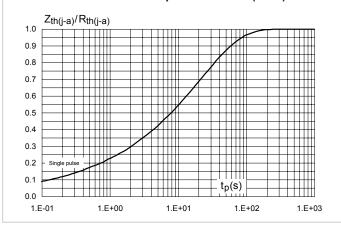


Figure 8. Relative variation of thermal impedance junction to ambient versus pulse duration (DO-201AD)

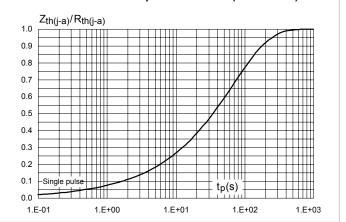


Figure 9. Relative variation of thermal impedance junction to ambient versus pulse duration (DO-15)

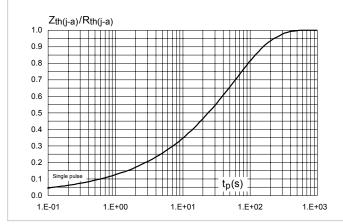


Figure 10. Reverse leakage current versus reverse voltage applied (typical values)

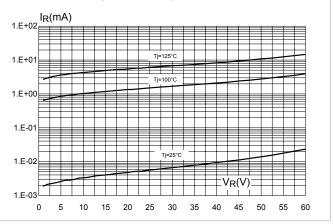


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

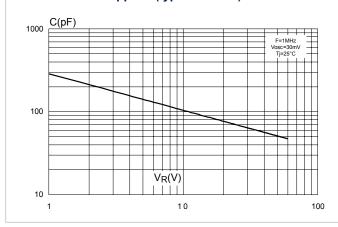
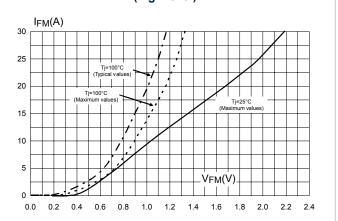


Figure 12. Forward voltage drop versus forward current (high level)



DS2134 - Rev 7 page 5/17



Figure 13. Forward voltage drop versus forward current (low level)

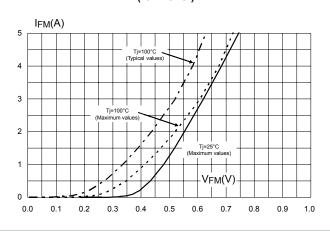


Figure 14. Thermal resistance junction to ambient versus copper surface under each lead (SMB flat, SMB flat Notch)

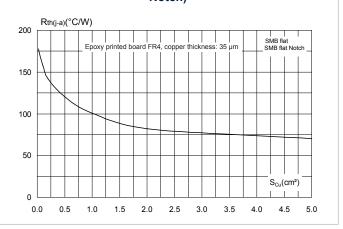


Figure 15. Thermal resistance junction to ambient versus copper surface under each lead (SMB)

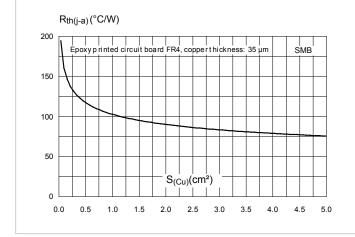


Figure 16. Thermal resistance versus lead length (DO-15)

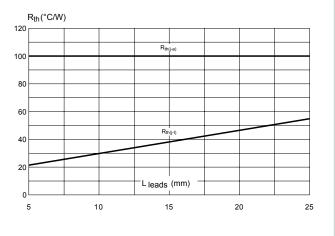
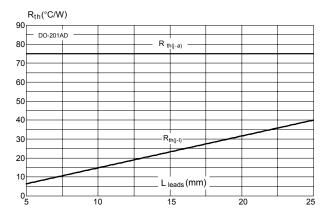


Figure 17. Thermal resistance versus lead length



DS2134 - Rev 7 page 6/17



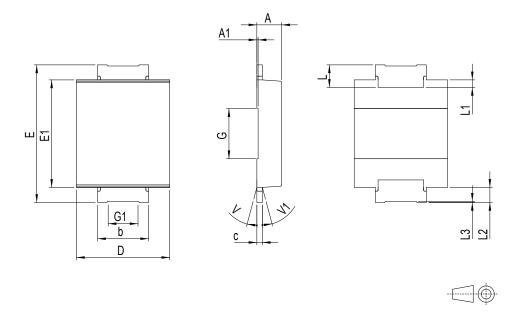
# 2 Package information

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: <a href="https://www.st.com">www.st.com</a>. ECOPACK is an ST trademark.

#### 2.1 SMB Flat Notch package information

- Epoxy meets UL94, V0
- · Lead-free package

Figure 18. SMB Flat Notch package outline



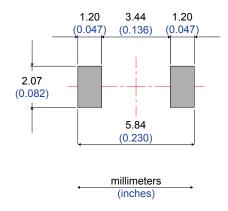
DS2134 - Rev 7 page 7/17



Table 4. SMB Flat Notch mechanical data

			Di	mensions		
Ref.		Millimeters			Inches	
	Min.	Тур.	Max.	Min.	Тур.	Max.
Α	0.90		1.10	0.035		0.043
A1		0.05			0.002	
b	1.95		2.20	0.077		0.087
С	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 19. Footprint recommendations, dimensions in mm (inches)



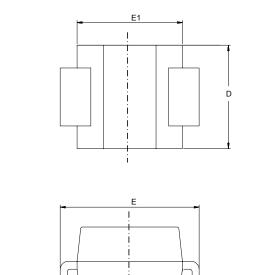
DS2134 - Rev 7 page 8/17



# 2.2 SMB package information

- Epoxy meets UL94, V0
- Lead-free package

Figure 20. SMB package outline



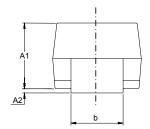


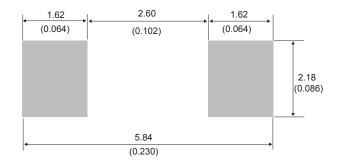
Table 5. SMB package mechanical data

	Dimensions					
Ref.	Millin	neters	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		
С	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		

DS2134 - Rev 7 page 9/17



Figure 21. SMB recommended footprint



DS2134 - Rev 7 page 10/17



# 2.3 SMB Flat package information

- Epoxy meets UL94, V0
- Lead-free package

Figure 22. SMB Flat package outline

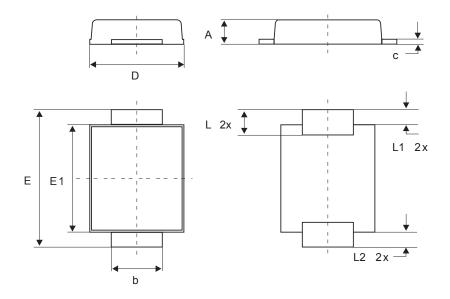


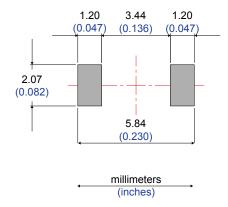
Table 6. SMB Flat mechanical data

	Dimensions					
Ref.	Millimeters			Inches		
	Min.	Тур.	Max.	Min.	Тур.	Max.
Α	0.90		1.10	0.035		0.044
b	1.95		2.20	0.076		0.087
С	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	

DS2134 - Rev 7 page 11/17



Figure 23. Footprint recommendations, dimensions in mm (inches)



DS2134 - Rev 7 page 12/17



# 2.4 DO-201AD package information

Epoxy meets UL 94, V0

Figure 24. DO-201AD package outline

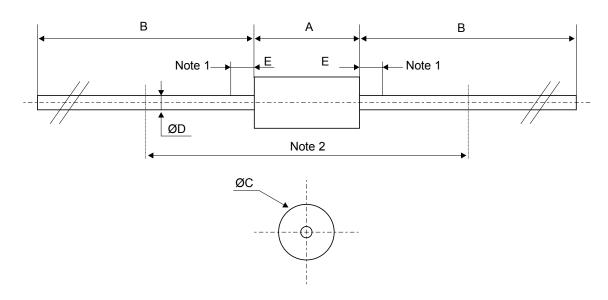


Table 7. DO-201AD package mechanical data

	Dimensions						
Ref.		Millimeters		Inche	Inches (for reference only)		
	Min.	Тур.	Max.	Min.	Тур.	Max.	
А		-	9.50		-	0.374	
В	25.40	-		1.000	-		
С		-	5.30		-	0.209	
D <sup>(1)</sup>		-	1.30		-	0.051	
Е		-	1.25			0.049	
Note 2 <sup>(2)</sup>	15.00			0.590			

- 1. The lead diameter D is not controlled over zone E
- 2. The minimum length, which must stay straight between the right angles after bending, is 15 mm (0.59")

DS2134 - Rev 7 page 13/17



# 2.5 DO-15 package information

Epoxy meets UL 94, V0

Figure 25. DO-15 package outline

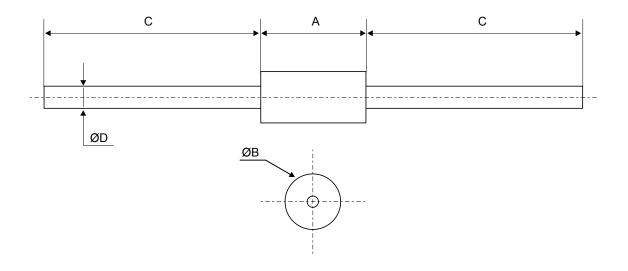


Table 8. DO-15 package mechanical data

	Dimensions					
Ref.	Millimeters			Inch	es (for reference	only)
	Min.	Тур.	Max.	Min.	Тур.	Max.
А	6.05	-	6.75	0.238	-	0.266
В	2.95	-	3.53	0.116	-	0.139
С	26.00	-	31.00	1.024	-	1.220
D	0.71	-	0.88	0.028	-	0.0035

DS2134 - Rev 7 page 14/17



# 3 Ordering information

**Table 9. Ordering information** 

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS3L60UFN	B36	SMB Flat Notch	0.056 g	5000	Tape and reel
STPS3L60U	G36	SMB	0.107 g	2500	Tape and reel
STPS3L60UF	FG36	SMB Flat	0.050 g	5000	Tape and reel
STPS3L60RL	STPS3L60	DO-201AD	1.12 g	1900	Tape and reel
STPS3L60Q	STPS3L60	DO-15	0.04 q	1000	Ammopack
STPS3L60QRL	STPS3L60	DO-15	0.04 g	6000	Tape and reel



# **Revision history**

Table 10. Document revision history

Date	Version	Changes
July-2003	5A	Previous issue.
12-Jun-2009	6	Reformatted to current standards. Added SMBflat package. Added ECOPACK statement. Added cathode band graphics.
31-Jan-2020	7	Added Section 2.1 SMB Flat Notch package information.



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DS2134 - Rev 7 page 17/17