

STPS30SM60

Power Schottky rectifier

Features

- High current capability
- Avalanche rated
- Low forward voltage drop
- High frequency operation

Description

The STPS30SM60D is a single diode Schottky rectifier, suited for high frequency switch mode power supply.

Packaged in TO-220AC, this device is intended to be used in notebook, game station and desktop adapters, providing in these aplications a good efficiency at both low and high load.

Table 1.Device summary

Symbol	Value
I _{F(AV)}	30 A
V _{RRM}	60 V
V _F (typ)	0.410 V
T _j (max)	150 °C

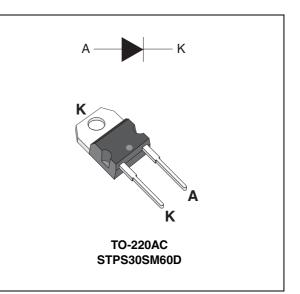
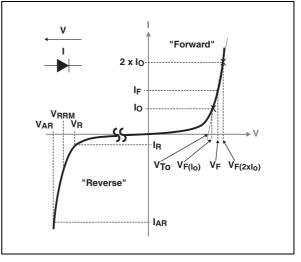


Figure 1. Electrical characteristics^(a)



a. V_{ARM} and I_{ARM} must respect the reverse safe operating area defined in *Figure 11*. V_{AR} and I_{AR} are pulse measurements ($t_p < 1 \ \mu$ s). V_R , I_R , V_{RRM} and V_F , are static characteristics

Characteristics 1

Absolute ratings (limiting values, at T_{amb} = 25 °C unless otherwise Table 2. specified)

Symbol		Value	Unit		
V _{RRM}	Repetitive peak reverse vol	tage		60	V
I _{F(RMS)}	Forward rms current			60	А
I _{F(AV)}	Average forward current, δ :	= 0.5	T _c = 125 °C	30	А
I _{FSM}	Surge non repetitive forward	d current	t _p = 10 ms sine-wave	400	А
P _{ARM} ⁽¹⁾	Repetitive peak avalanche	power	28000	W	
V _{ARM} ⁽²⁾	Maximum repetitive peak avalanche voltage	t _p < 1 μs, T _j < 1	80	V	
V _{ASM} ⁽²⁾	Maximum repetitive peak avalanche voltage	t _p < 1 μs, T _j < 1	80	V	
T _{stg}	Storage temperature range	arature range			°C
Тj	Maximum operating junction temperature ⁽³⁾ 150			150	°C

1. For temperature or pulse time duration deratings, please refer to *Figure 4* and *5*. More details regarding the avalanche energy measurements and diode validation in the avalanche are provided in the application notes AN1768 and AN2025.

2. See Figure 11

 $\frac{dPtot}{dT_j} < \frac{1}{Rth(j-a)}$ condition to avoid thermal runaway for a diode on its own heatsink З.

Table 3. **Thermal parameters**

\$ Symbol	Parameter	Value	Unit
R _{th(j-c)}	Junction to case	1.0	°C/W

Table 4. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Тур.	Max.	Unit
I _B ⁽¹⁾	Reverse leakage	T _j = 25 °C	VV	-	30	135	μΑ
$T_{j} = 125 \text{ °C}$	$V_{R} = V_{RRM}$	-	20	80	mA		
V _F ⁽²⁾ Forward voltage drop		T _j = 25 °C	l _F = 15 A	-	0.500	0.540	
	T _j = 125 °C	1F - 13 A	-	0.410	0.470	v	
	Forward voltage drop	T _j = 25 °C		-	0.570	0.640	v
		T _j = 125 °C	I _F = 30 A	-	0.515	0.600	

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 = 0.435 x ${I_{F(AV)}}$ + 0.0055 x ${I_{F}}^2{}_{(RMS)}$



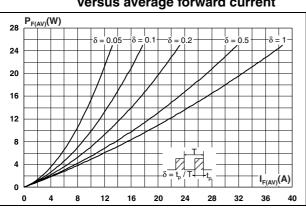


Figure 2. Average forward power dissipation Figure 3. versus average forward current



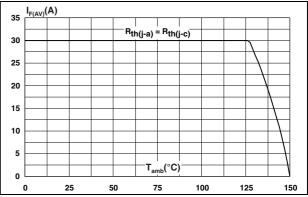


Figure 4. Normalized avalanche power derating versus pulse duration

Figure 5. Normalized avalanche power derating versus junction temperature

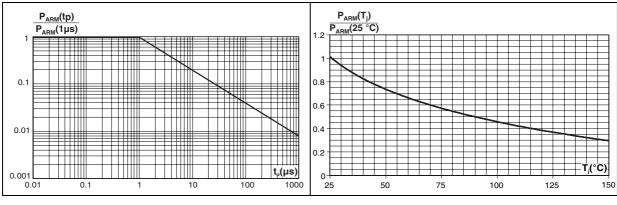
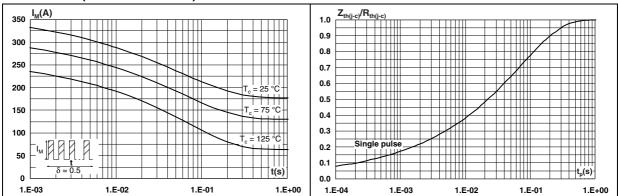


Figure 6. Non repetitive surge peak forward current versus overload duration (maximum values)

Figure 7. Relative thermal impedance junction to case versus pulse duration





F = 1 MHz

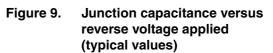
 $V_{R}(V)$

100

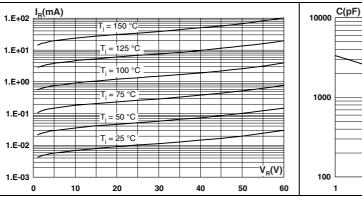
 $_{\rm osc} = 30 \, \rm mV_{R}$

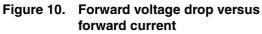
T_i = 25 °C

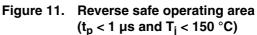
Figure 8. Reverse leakage current versus reverse voltage applied (typical values)

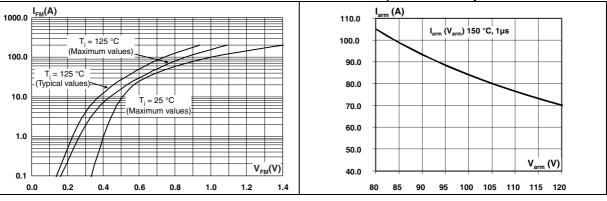


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2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.4 to 0.6 N·m

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: <u>www.st.com</u>. ECOPACK[®] is an ST trademark.

Table 5. TO-220AC dimensions

				Dimer	nsions	
		Ref.	Millin	neters	Inc	hes
			Min.	Max.	Min.	Max.
		А	4.40	4.60	0.173	0.181
H2 ←	A	С	1.23	1.32	0.048	0.051
		D	2.40	2.72	0.094	0.107
	L7	E	0.49	0.70	0.019	0.027
		F	0.61	0.88	0.024	0.034
L6		F1	1.14	1.70	0.044	0.066
		G	4.95	5.15	0.194	0.202
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		L2	16.40 typ.		0.645 typ.	
	L4	13.00	14.00	0.511	0.551	
	M	L5	2.65	2.95	0.104	0.116
	→ E	L6	15.25	15.75	0.600	0.620
G		L7	6.20	6.60	0.244	0.259
		L9	3.50	3.93	0.137	0.154
		М	2.6	typ.	0.102	2 typ.
		Diam. I	3.75	3.85	0.147	0.151

3 Ordering information

Table 6.Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS30SM60D	STPS30SM60D	TO-220AC	1.86 g	50	Tube

4 Revision history

Table 7.Revision history

Date	Revision	Changes
14-Oct-2011	1	Initial release.



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