STPS20SM60

Power Schottky rectifier

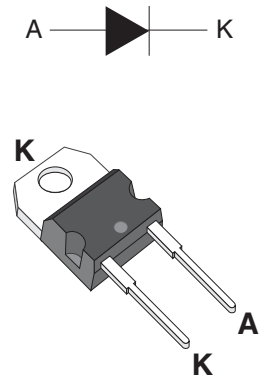
Features

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

Description

The STPS20SM60D 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 applications a good efficiency at both low and high load.

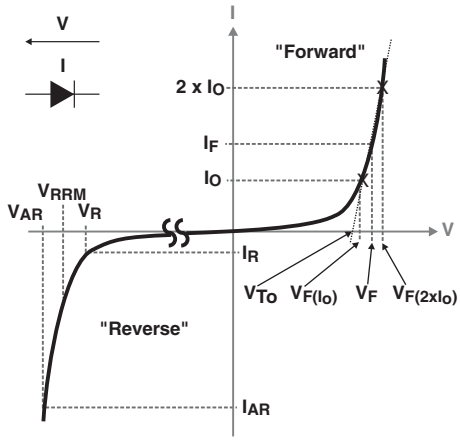


TO-220AC
STPS20SM60D

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	20 A
V_{RRM}	60 V
V_F (typ)	0.41 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 µs). V_R, I_R, V_{RRM} and V_F, are static characteristics

1 Characteristics

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

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		60	V
$I_{F(RMS)}$	Forward rms current		60	A
$I_{F(AV)}$	Average forward current, δ = 0.5	T_c = 130 °C	20	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sine-wave	400	A
P_{ARM}(1)	Repetitive peak avalanche power	T_j = 25 °C, t_p = 1 µs	18400	W
V_{ARM}(2)	Maximum repetitive peak avalanche voltage	t_p < 1 µs, T_j < 150 °C, I_{AR} < 69 A	80	V
V_{ASM}(2)	Maximum repetitive peak avalanche voltage	t_p < 1 µs, T_j < 150 °C, I_{AR} < 69 A	80	V
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Maximum operating junction temperature(3)		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*
3. $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ condition to avoid thermal runaway for a diode on its own heatsink

Table 3. Thermal parameters

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case	1.3	°C/W

Table 4. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-	20	85	µA
		T_j = 125 °C		-	15	50	mA
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 10 A	-	0.495	0.535	V
		T_j = 125 °C		-	0.410	0.460	
		T_j = 25 °C	I_F = 20 A	-	0.570	0.630	
		T_j = 125 °C		-	0.510	0.580	

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:
$P = 0.430 \times I_{F(AV)} + 0.0075 \times I_F{}^2{}_{(RMS)}$

Figure 2. Average forward power dissipation versus average forward current

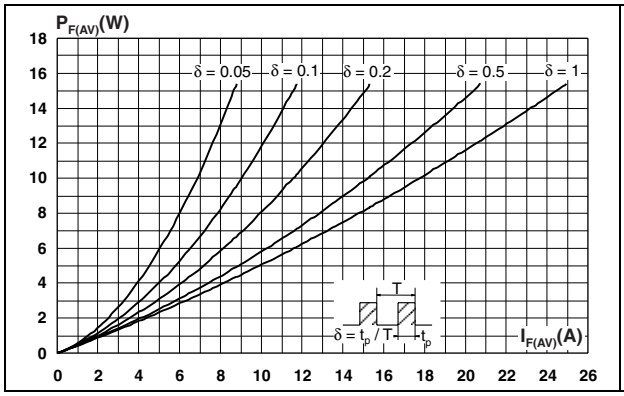


Figure 3. Average forward current versus ambient temperature (δ = 0.5)

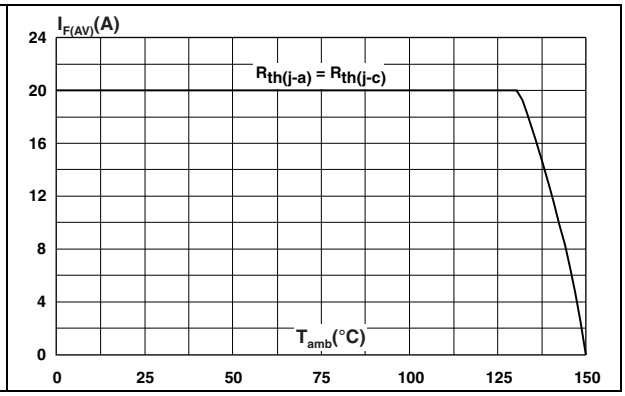


Figure 4. Normalized avalanche power derating versus pulse duration

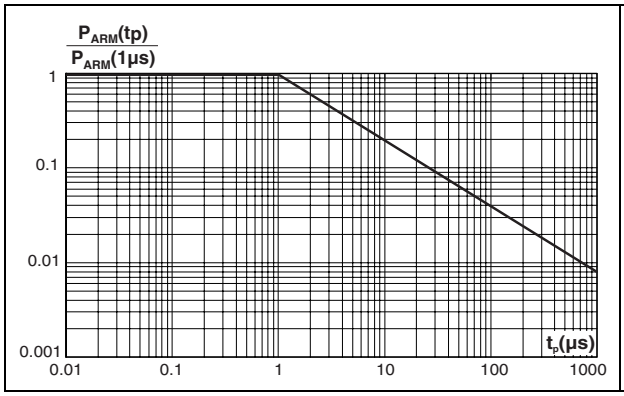


Figure 5. Normalized avalanche power derating versus junction temperature

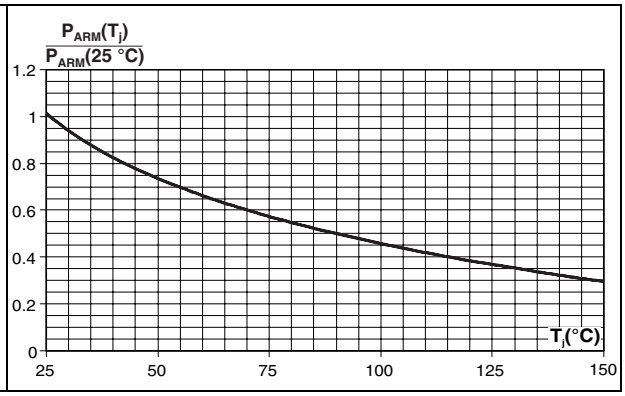


Figure 6. Non repetitive surge peak forward current versus overload duration (maximum values)

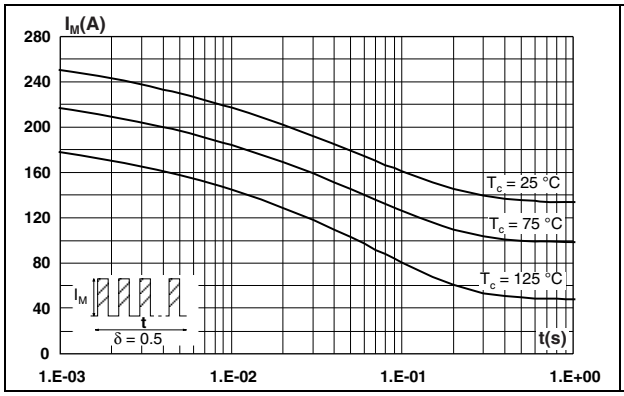


Figure 7. Relative thermal impedance junction to case versus pulse duration

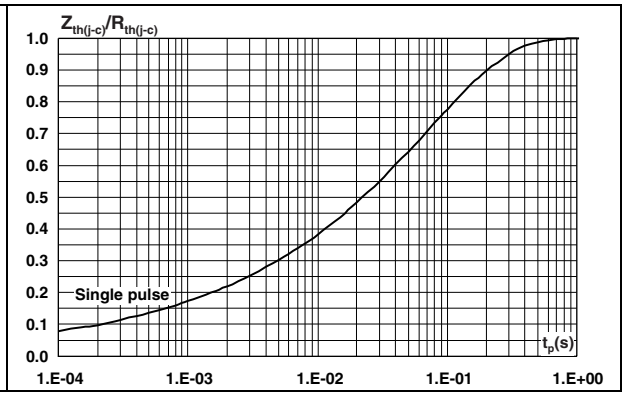


Figure 8. Reverse leakage current versus reverse voltage applied (typical values)

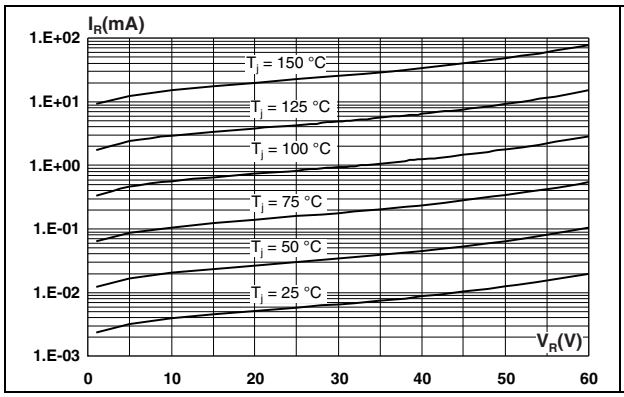


Figure 9. Junction capacitance versus reverse voltage applied (typical values)

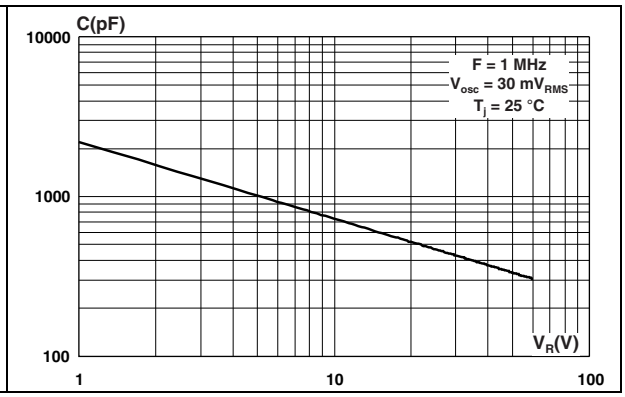


Figure 10. Forward voltage drop versus forward current

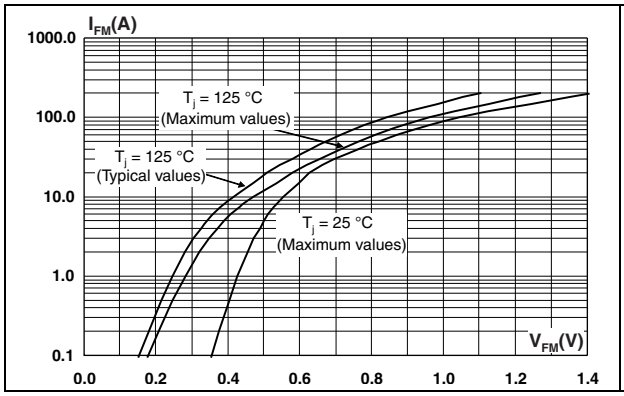
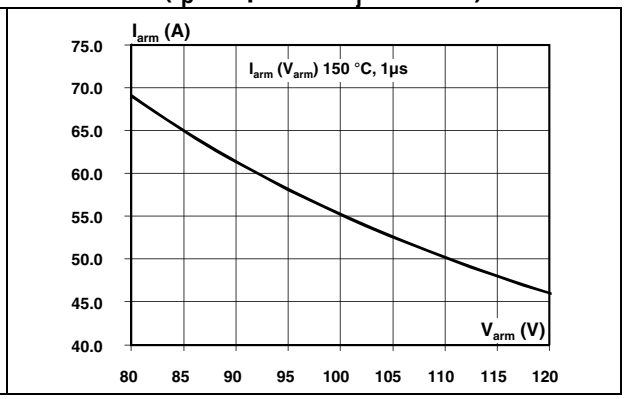


Figure 11. Reverse safe operating area (t_p < 1 µs and T_j < 150 °C)



2 Package information

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

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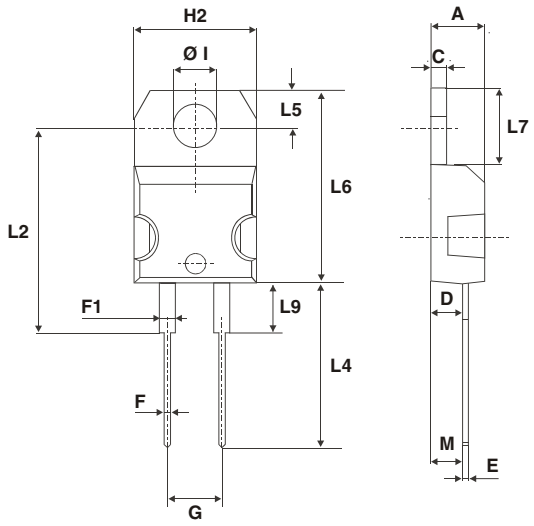
Table 5. TO-220AC dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
H2	10.00	10.40	0.393	0.409
L2	16.40 typ.		0.645 typ.	
L4	13.00	14.00	0.511	0.551
L5	2.65	2.95	0.104	0.116
L6	15.25	15.75	0.600	0.620
L7	6.20	6.60	0.244	0.259
L9	3.50	3.93	0.137	0.154
M	2.6 typ.		0.102 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
STPS20SM60D	STPS20SM60D	TO-220AC	1.86 g	50	Tube

4 Revision history

Table 7. Revision history

Date	Revision	Changes
25-Oct-2011	1	First issue.

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