STPS20SM80C

Power Schottky rectifier

Features

- High junction temperature capability
- Optimized trade-off between leakage current and forward voltage drop
- Low leakage current
- Avalanche capability specified
- Insulated package TO-220FPAB
  - insulated voltage: 2000 V
  - package capacitance: 45 pF

Description

This dual diode Schottky rectifier is suited for high frequency switch mode power supply.

Packaged in TO-220AB, I^2PAK, D^2PAK and TO-220FPAB, this device is particularly suited for use in notebook, game station, LCD TV and desktop adapters, providing these applications with a good efficiency at both low and high load.

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 x 10 A
V_{RRM}	80 V
T_j (max)	175 °C
V_F (typ)	515 mV

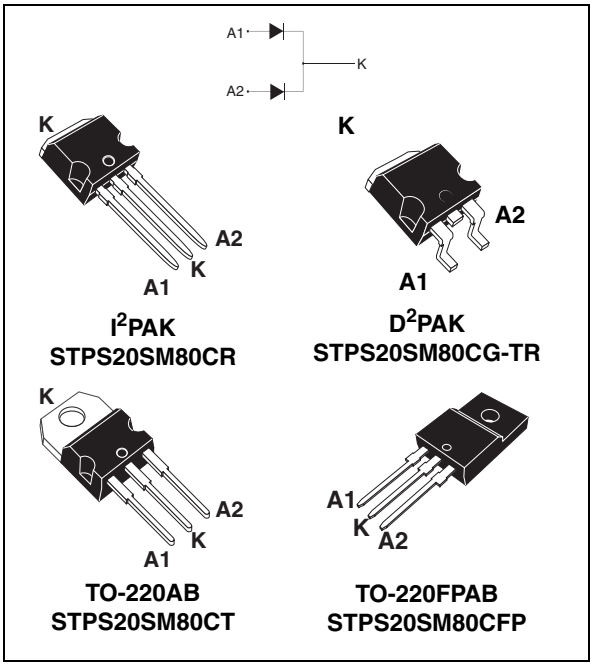
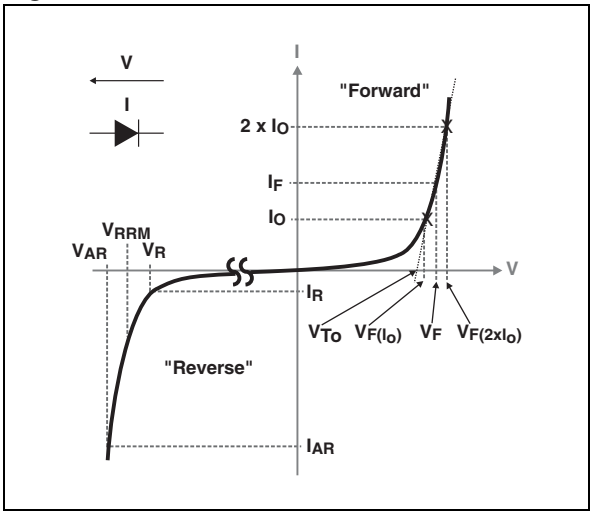


Figure 1. Electrical characteristics(a)



1 Characteristics

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

Symbol	Parameter				Value	Unit
V_{RRM}	Repetitive peak reverse voltage				80	V
$I_{F(RMS)}$	Forward rms current				30	A
$I_{F(AV)}$	Average forward current, δ = 0.5	TO-220AB, I^2PAK, D^2PAK	T_c = 155 °C	Per diode	10	A
			T_c = 150 °C	Per device	20	
		TO-220FPAB	T_c = 130 °C	Per diode	10	
			T_c = 100 °C	Per device	20	
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		T_c = 25 °C	220	A
P_{ARM}(1)	Repetitive peak avalanche power		T_j = 25 °C, t_p = 1 µs		5400	W
V_{ARM}(2)	Maximum repetitive peak avalanche voltage	t_p < 1 µs, T_j < 150 °C, I_{AR} < 16.2 A			100	V
V_{ASM}(2)	Maximum single pulse peak avalanche voltage	t_p < 1 µs, T_j < 150 °C, I_{AR} < 16.2 A			100	V
T_{stg}	Storage temperature range				-65 to +175	°C
T_j	Maximum operating junction temperature(3)				175	°C

1. For temperature or pulse time duration deratings, please refer to figure 3 and 4. More details regarding the avalanche energy measurements and diode validation in the avalanche are provided in the application notes AN1768 and AN2025.
2. See
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	TO-220AB I^2PAK, D^2PAK	per diode	2.30	°C/W
			total	1.55	
		TO-220FPAB	per diode	5.80	
			total	4.65	
$R_{th(c)}$	Coupling	TO-220AB I^2PAK, D^2PAK		0.80	°C/W
		TO-220FPAB		3.50	

When the two diodes 1 and 2 are used simultaneously:

ΔT_j(diode 1) = P(diode 1) x $R_{th(j-c)}$(Per diode) + P(diode 2) x $R_{th(c)}$

Table 4. Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-	5.8	25	µA
		T_j = 125 °C		-	5	15	mA
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 5 A	-	0.590	0.640	V
		T_j = 125 °C		-	0.515	0.550	
		T_j = 25 °C	I_F = 10 A	-	0.710	0.780	
		T_j = 125 °C		-	0.595	0.650	
		T_j = 25 °C	I_F = 20 A	-	0.850	0.945	
		T_j = 125 °C		-	0.690	0.780	

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:
$P = 0.52 \times I_{F(AV)} + 0.013 \times I_F^2{}_{(RMS)}$

Figure 2. Average forward power dissipation versus average forward current (per diode)

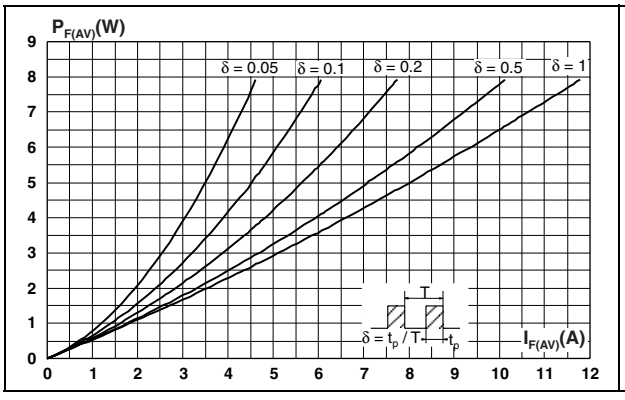


Figure 3. Average forward current versus ambient temperature (δ = 0.5, per diode)

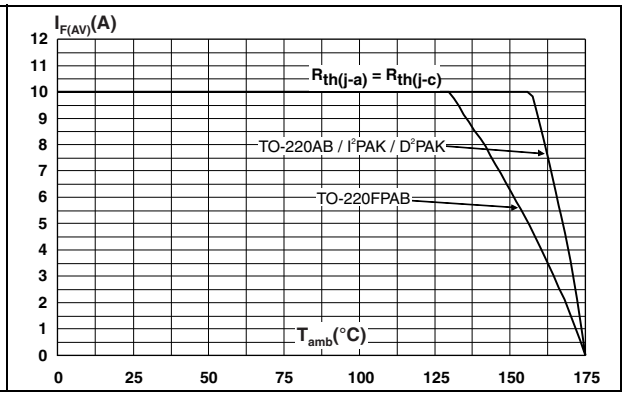


Figure 4. Normalized avalanche power derating versus pulse duration

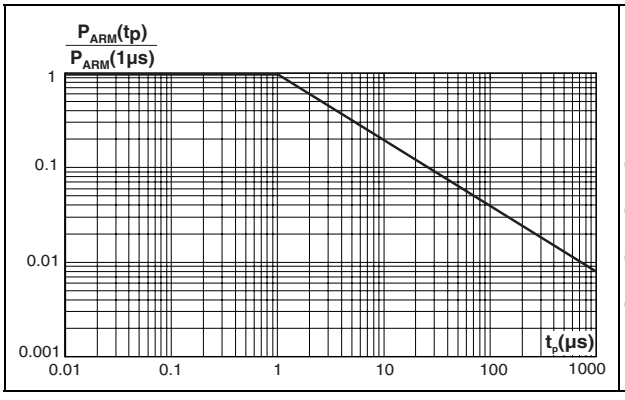
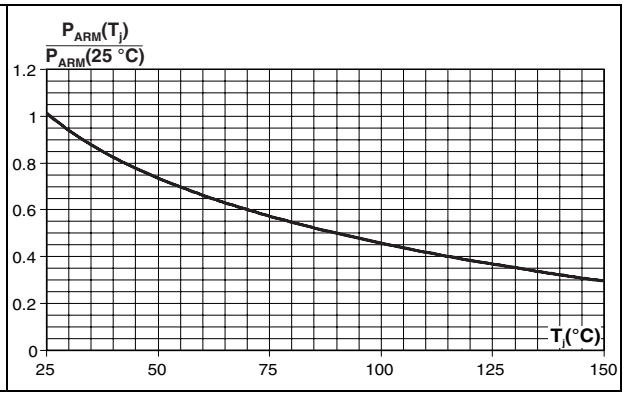


Figure 5. Normalized avalanche power derating versus junction temperature



3 Ordering information

Table 9. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS20SM80CT	PS20SM80CT	TO-220AB	1.9 g	50	Tube
STPS20SM80CFP	PS20SM80CFP	TO-220FPAB	2.0 g	50	Tube
STPS20SM80CR	PS20SM80CR	I^2PAK	1.49 g	50	Tube
STPS20SM80CG-TR	PS20SM80CG	D^2PAK	1.48 g	1000	Tape and reel