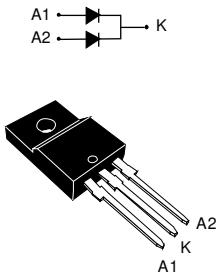
STPS30SM80C

Power Schottky rectifier

Datasheet - production data



TO-220FPAB

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_{RMS} sine

Description

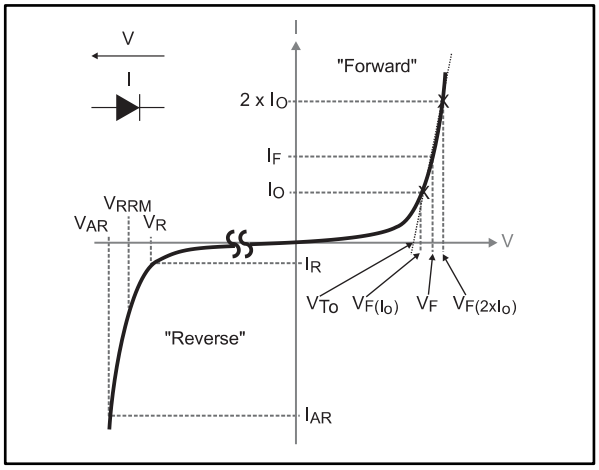
This dual diode Schottky rectifier is suited for high frequency switch mode power supply.

Packaged in 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 15 A
V_{RRM}	80 V
T_j(max.)	175 °C
V_F(typ.)	515 mV

Figure 1: Electrical characteristics



V_{ARM} and I_{ARM} must respect the reverse safe operating area defined in Figure 9. V_{AR} and I_{AR} are pulse measurements (t_p < 1 µs). V_R, I_R, V_{RRM} and V_F, are static characteristics.

This is information on a product in full production.

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1 Characteristics

Table 2: Absolute ratings (limiting values, per diode, at 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, square wave	T_C = 105 °C	Per diode	15	A
		T_C = 70 °C	Per device	30	
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		220	A
P_{ARM} (1)	Repetitive peak avalanche power	t_p = 10 µs, T_j = 125 °C		545	W
V_{ARM} (2)	Maximum repetitive peak avalanche voltage	t_p < 1 µs, T_j < 150 °C, I_{AR} < 22.8 A		100	V
V_{ASM} (2)	Maximum single pulse peak avalanche voltage	t_p < 1 µs, T_j < 150 °C, I_{AR} < 22.8 A		100	V
T_{stg}	Storage temperature range			-65 to +175	°C
T_j	Maximum operating junction temperature (3)			175	°C

Notes:

(1)For pulse time duration deratings, please refer to figure 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 Figure 9

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

Table 3: Thermal parameters

Symbol	Parameter		Max. value	Unit
$R_{th(j-c)}$	Junction to case	Per diode	5.30	°C/W
		Total	4.20	
$R_{th(c)}$	Coupling		3.10	°C/W

When the diodes 1 and 2 are used simultaneously:

$\Delta T_{j\ (diode1)} = P_{(diode1)} \times R_{th(j-c)}$ (per diode) + $P_{(diode2)} \times R_{th(c)}$

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	$V_R = V_{RRM}$	-	10	40	µA
		T_j = 125 °C		-	7	20	mA
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 7.5 A	-	0.590	0.655	V
		T_j = 125 °C		-	0.515	0.555	
		T_j = 25 °C	I_F = 15 A	-	0.715	0.790	
		T_j = 125 °C		-	0.600	0.675	
		T_j = 25 °C	I_F = 30 A	-	0.860	0.965	
		T_j = 125 °C		-	0.710	0.830	

Notes:

(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:

$P = 0.520 \times I_{F(AV)} + 0.0103 \times I_{F^2(RMS)}$

1.1 Characteristics (curves)

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

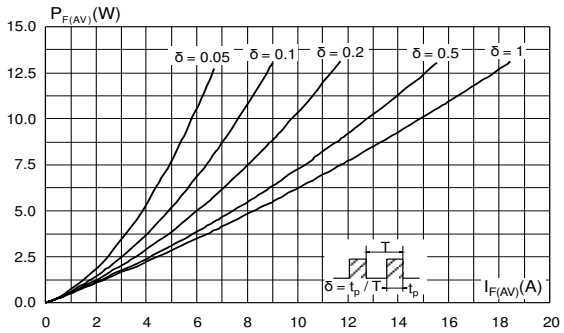


Figure 3: Average forward current versus ambient temperature (δ = 0.5, per diode)

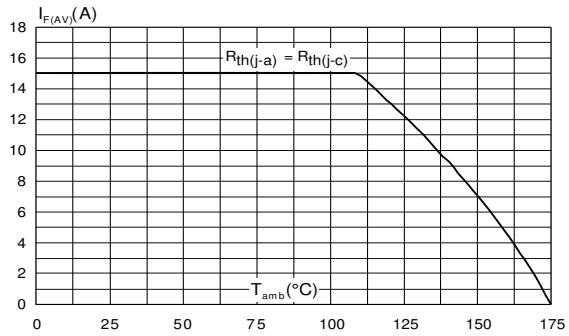


Figure 4: Normalized avalanche power derating versus pulse duration (T_j = 125 °C)

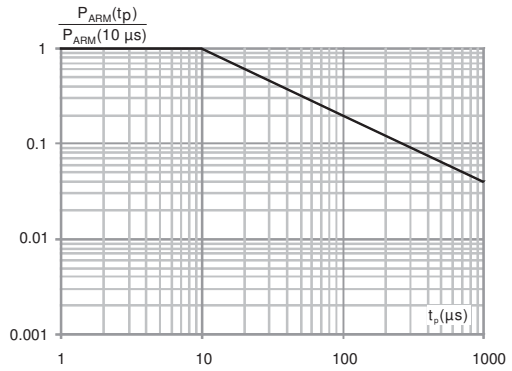


Figure 5: Relative thermal impedance junction to case versus pulse duration

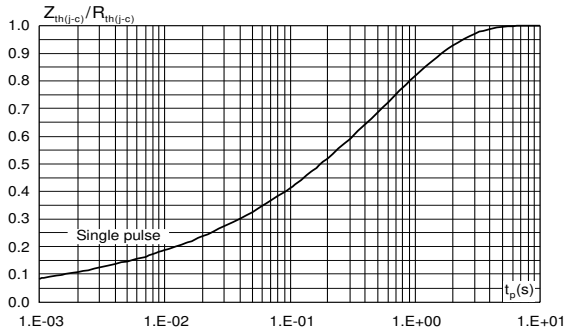


Figure 6: Reverse leakage current versus reverse voltage applied (typical values, per diode)

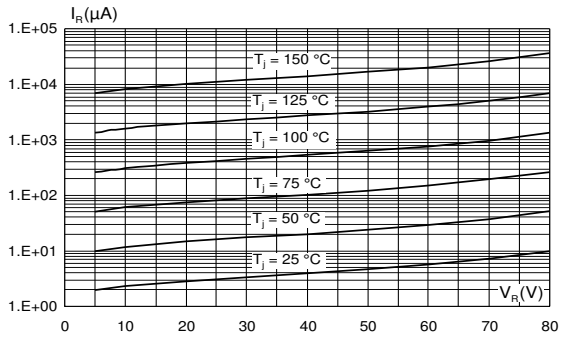


Figure 7: Junction capacitance versus reverse voltage applied (typical values, per diode)

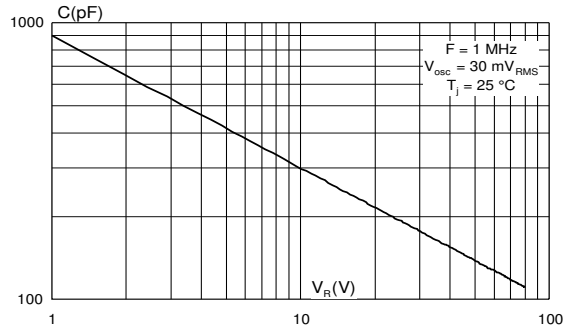


Figure 8: Forward voltage drop versus forward current (per diode)

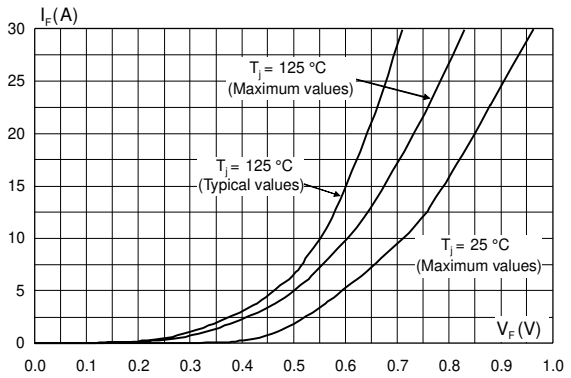
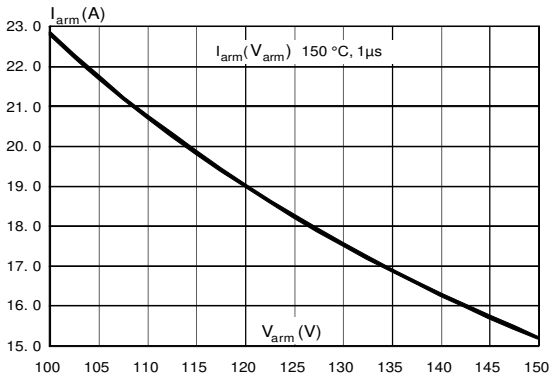


Figure 9: Reverse safe operating area (t_p < 1 µs and T_j < 150 °C)



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.

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.7 N·m

2.1 TO-220FPAB package information

Figure 10: TO-220FPAB package outline

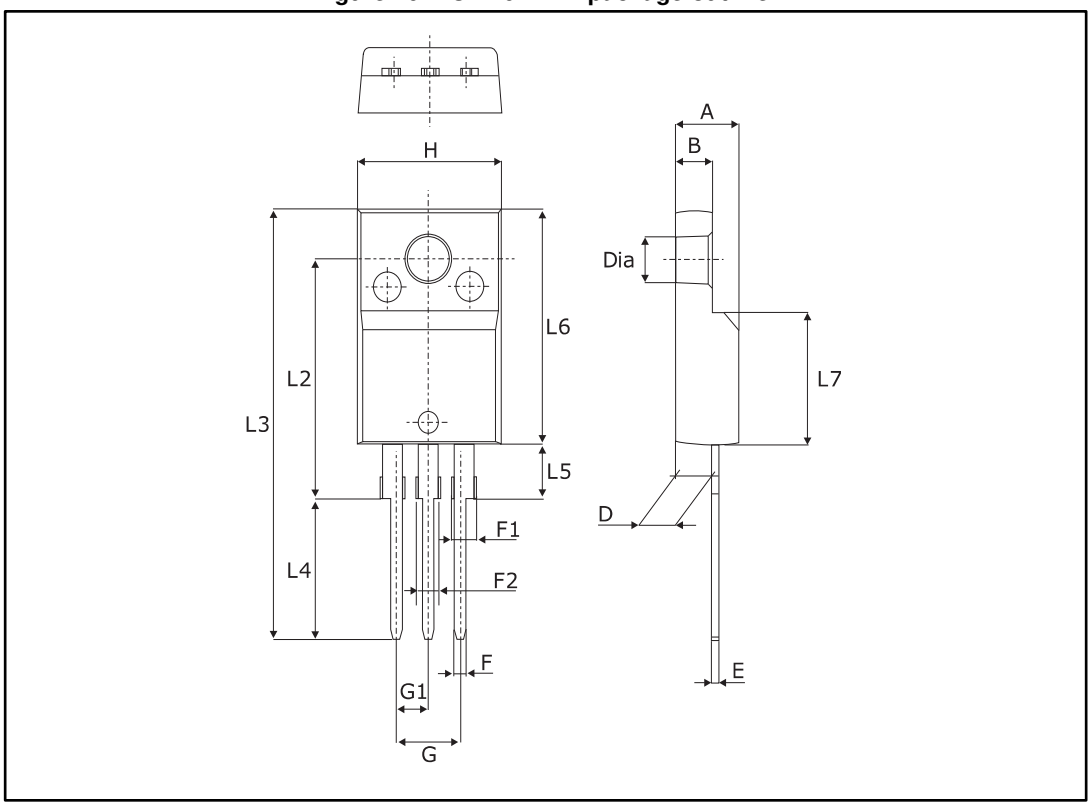


Table 5: TO-220FPAB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
B	2.5	2.7	0.098	0.106
D	2.50	2.75	0.098	0.108
E	0.45	0.70	0.018	0.027
F	0.75	1.0	0.03	0.039
F1	1.15	1.70	0.045	0.067
F2	1.15	1.70	0.045	0.067
G	4.95	5.20	0.195	0.205
G1	2.40	2.70	0.094	0.106
H	10.00	10.40	0.393	0.409
L2	16.00 typ.		0.63 typ.	
L3	28.60	30.60	1.126	1.205
L4	9.80	10.6	0.386	0.417
L5	2.90	3.60	0.114	0.142
L6	15.90	16.40	0.626	0.646
L7	9.00	9.30	0.354	0.366
Dia	3.0	3.20	0.118	0.126

3 Ordering information

Table 6: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS30SM80CFP	PS30SM80CFP	TO-220FPAB	2.0 g	50	Tube

4 Revision history

Table 7: Document revision history

Date	Revision	Changes
11-Apr-2011	1	First issue.
12-May-2017	2	Removed D²PAK, I²PAK and TO-220AB packages.

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