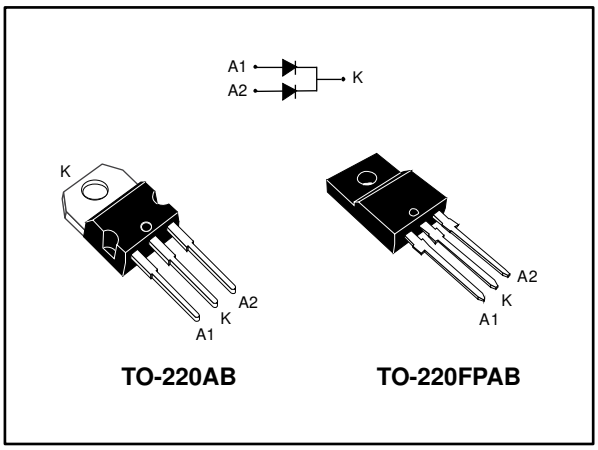
STPS20SM80C

Power Schottky rectifier

Datasheet - production data



TO-220AB **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

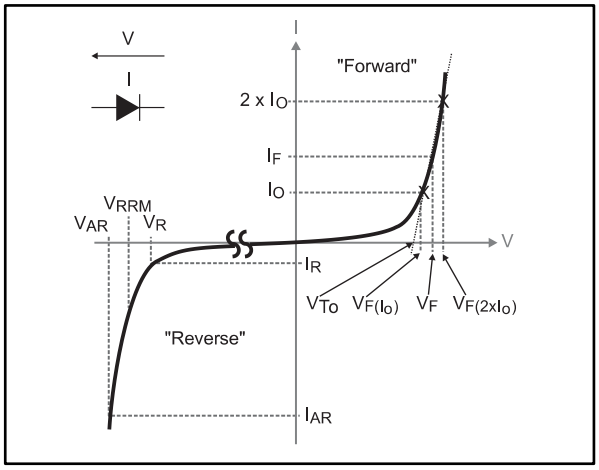
This dual diode Schottky rectifier is suited for high frequency switch mode power supply.

Packaged in TO-220AB 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



V_{ARM} and I_{ARM} must respect the reverse safe operating area defined in Figure 10. 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. www.st.com

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	TO-220AB	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		220	A
P_{ARM} (1)	Repetitive peak avalanche power		t_p = 10 µs, T_j = 125 °C		385	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

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 10

(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	TO-220AB	Per diode	2.30	°C/W
			Total	1.55	
		TO-220FPAB	Per diode	5.80	
			Total	4.65	
$R_{th(c)}$	Coupling	TO-220AB		0.80	°C/W
		TO-220FPAB		3.50	

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	$V_R = V_{RRM}$	-	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	

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:

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

1.1 Characteristics (curves)

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

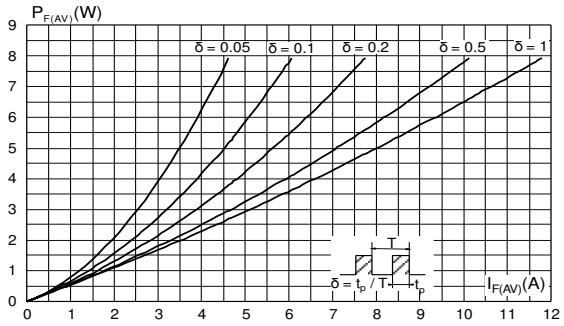


Figure 3: Average forward current versus ambient temperature (δ = 0.5, per diode)

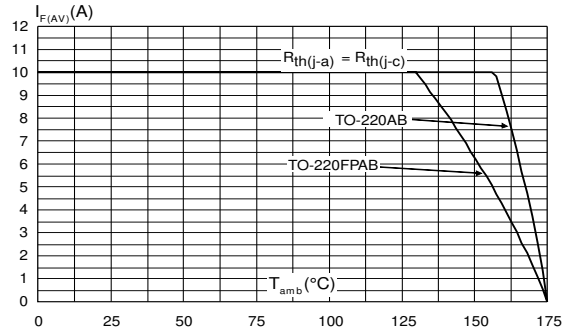


Figure 4: Normalized avalanche power derating versus pulse duration (T_j = 125 °C)

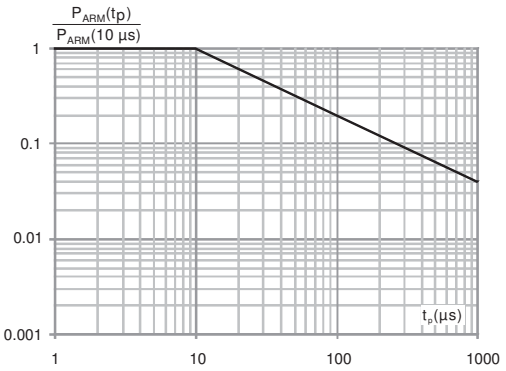


Figure 5: Relative thermal impedance junction to case versus pulse duration (TO-220AB)

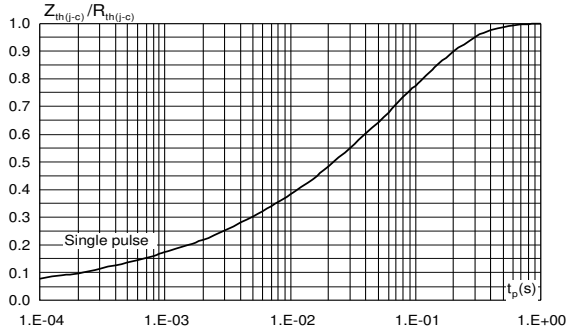


Figure 6: Relative thermal impedance junction to case versus pulse duration (TO-220FPAB)

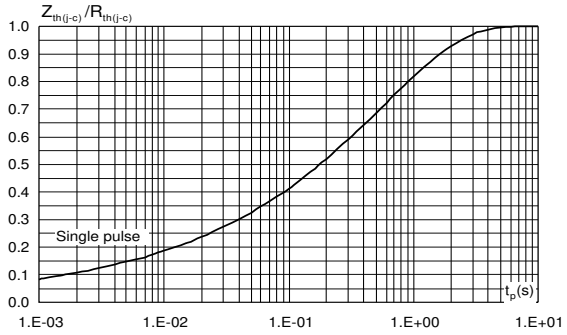


Figure 7: Reverse leakage current versus reverse voltage applied (typical values, per diode)

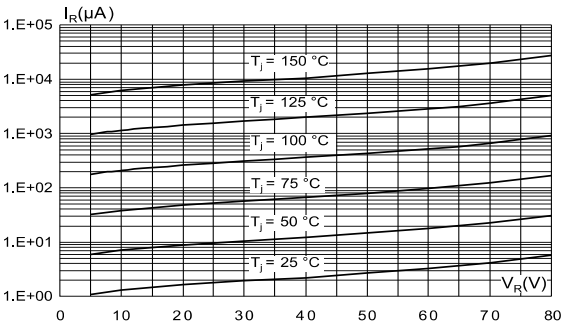


Figure 8: Junction capacitance versus reverse voltage applied (typical values, per diode)

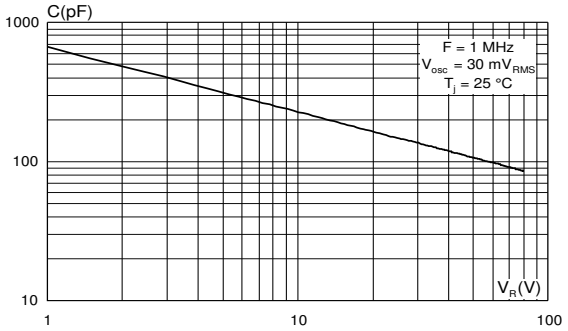


Figure 9: Forward voltage drop versus forward current (per diode)

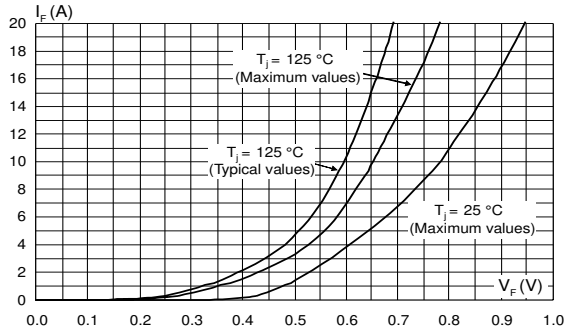
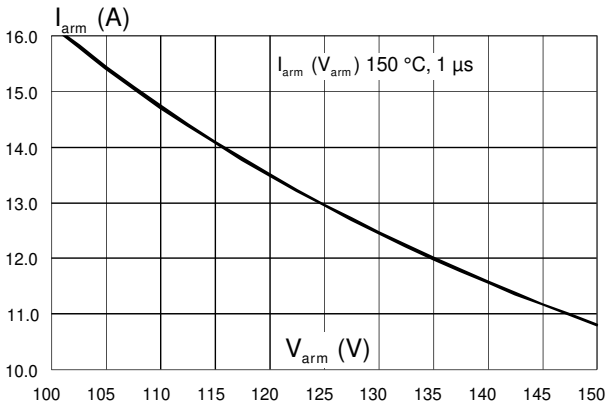


Figure 10: Reverse safe operating area (t_p < 1 µs and T_j < 150 °C)



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 (for TO-220AB and TO-220FPAB)
- Maximum torque value: 0.7 N·m (for TO-220AB and TO-220FPAB)

2.1 TO-220AB package information

Figure 11: TO-220AB package outline

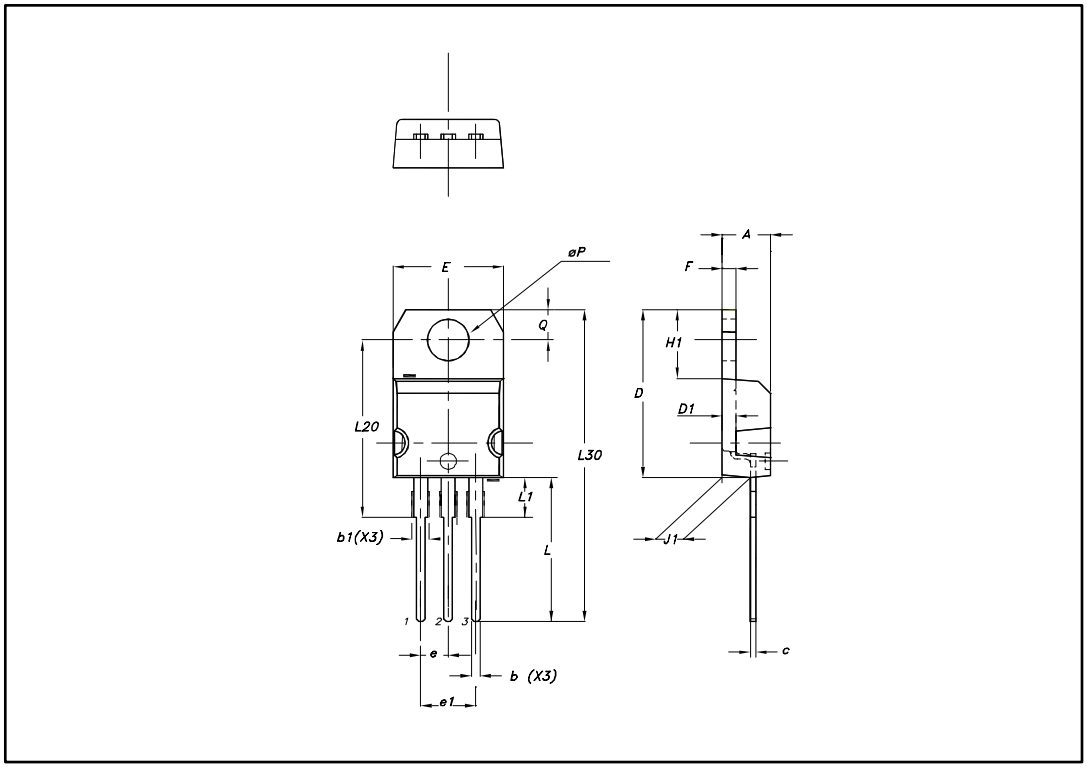


Table 5: TO-220AB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
b	0.61	0.88	0.240	0.035
b1	1.14	1.70	0.045	0.067
c	0.48	0.70	0.019	0.028
D	15.25	15.75	0.600	0.620
D1	1.27 typ.		0.050 typ.	
E	10.00	10.40	0.394	0.409
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
F	1.23	1.32	0.048	0.052
H1	6.20	6.60	0.244	0.260
J1	2.40	2.72	0.094	0.107
L	13.00	14.00	0.512	0.551
L1	3.50	3.93	0.138	0.155
L20	16.40 typ.		0.646 typ.	
L30	28.90 typ.		1.138 typ.	
θP	3.75	3.85	0.148	0.152
Q	2.65	2.95	0.104	0.116

2.2 TO-220FPAB package information

Figure 12: TO-220FPAB package outline

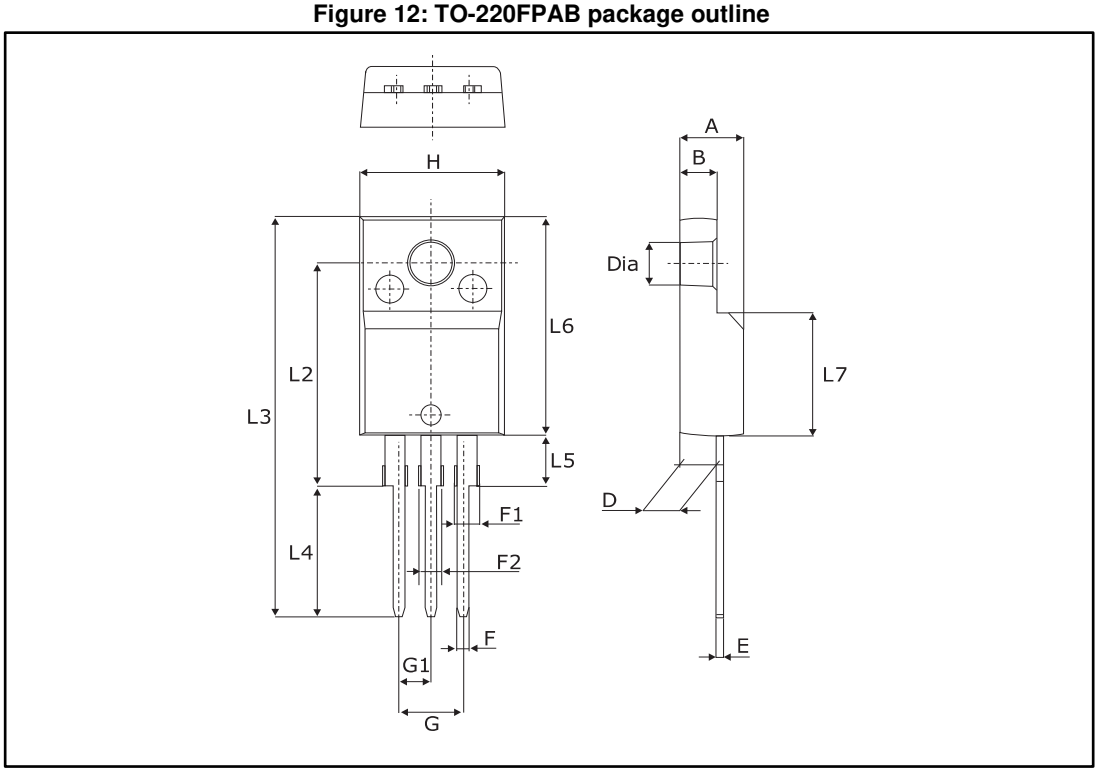


Table 6: TO-220FPAB package mechanical data

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 7: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS20SM80CT	PS20SM80CT	TO-220AB	1.9 g	50	Tube
STPS20SM80CFP	PS20SM80CFP	TO-220FPAB	1.9 g	50	Tube

4 Revision history

Table 8: Document revision history

Date	Revision	Changes
11-Apr-2011	1	First issue.
12-May-2017	2	Removed D²PAK and DPAK packages.

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