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Power Schottky rectifier

Features

- High junction temperature capability
- Avalanche capability specified
- Low forward voltage drop current
- High frequency operation
- Insulated package: TO-220FPAB
 - Insulating voltage = 1500 V rms
 - Typical package capacitance 12 pF

Description

This dual center tap Schottky rectifier is suited for high frequency switch mode power supplies.

Packaged in TO-220AB, I²PAK and TO-220FPAB, this device provides adaptor designers with an optimized price-performance ratio.

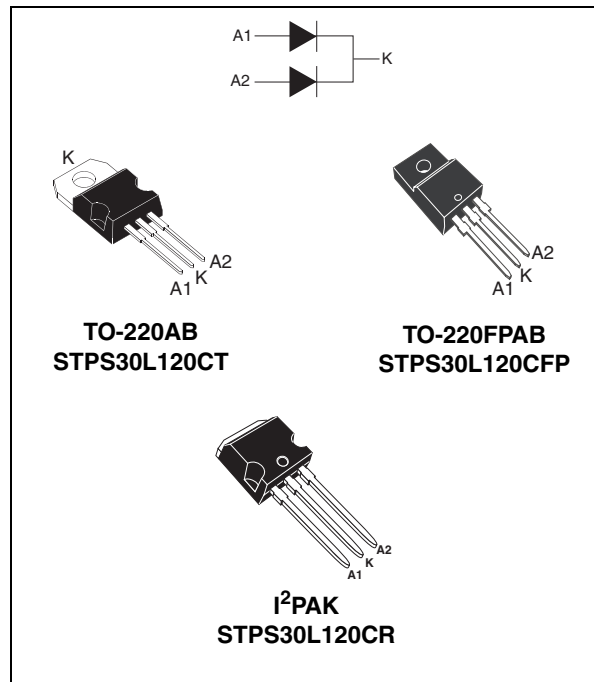


Figure 1. Electrical characteristics (a)

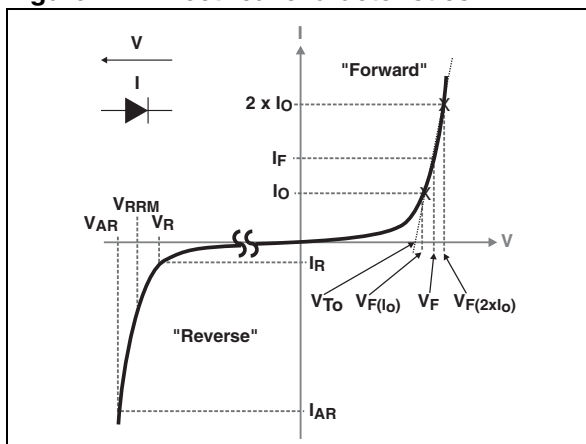


Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 x 15 A
V_{RRM}	120 V
$T_{j(max)}$	150 °C
$V_{F(typ)}$	0.51 V

- a. V_{ARM} and I_{ARM} must respect the reverse safe operating area defined in [Figure 13](#). 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.

1 Characteristics

Table 2. Absolute ratings (limiting values, per diode)

Symbol	Parameter		Value	Unit
V _{RRM}	Repetitive peak reverse voltage		120	V
I _{F(RMS)}	Forward rms current		30	A
I _{F(AV)}	Average forward current, δ = 0.5	Total package	30	A
I _{FSM}	Surge non repetitive forward current	t _p = 10 ms sinusoidal	220	A
P _{ARM}	Repetitive peak avalanche power	t _p = 1 μs, T _j = 25 °C	11500	W
V _{ARM} ⁽¹⁾	Maximum repetitive peak avalanche voltage	t _p = 1 μs, T _j < 150 °C, I _{AR} < 23 A	150	V
V _{ASM} ⁽¹⁾	Maximum single pulse peak avalanche voltage	t _p = 1 μs, T _j < 150 °C, I _{AR} < 23 A	150	V
T _{stg}	Storage temperature range		-65 to + 175	°C
T _j	Maximum operating junction temperature ⁽²⁾		150	°C

1. Refer to [Figure 13](#)

2. $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$ 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 ² PAK	Per diode	1.3	°C/W
			Total	0.7	
		TO-220FPAB	Per diode	4.5	
			Total	3.8	
R _{th(c)}	Coupling	TO-220AB, I ² PAK	Total	0.1	
		TO-220FPAB		3	

When the diodes 1 and 2 are used simultaneously :

$$T_j(\text{diode 1}) = P(\text{diode 1}) \times R_{th(j-c)}(\text{per diode}) + P(\text{diode 2}) \times R_{th(c)}$$

Table 4. Static electrical characteristics (per diode)

Symbol	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ }^\circ\text{C}$	-	-	200	μA
		$T_j = 125\text{ }^\circ\text{C}$	-	12	35	mA
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ }^\circ\text{C}$	-	-	0.675	V
		$T_j = 125\text{ }^\circ\text{C}$				
		$T_j = 25\text{ }^\circ\text{C}$	-	-	0.88	
		$T_j = 125\text{ }^\circ\text{C}$				
		$T_j = 25\text{ }^\circ\text{C}$	-	-	1.08	
		$T_j = 125\text{ }^\circ\text{C}$				

1. Pulse test : $t_p = 5\text{ ms}$, $\delta < 2\%$

2. Pulse test : $t_p = 380\text{ }\mu\text{s}$, $\delta < 2\%$

To evaluate the maximum conduction losses use the following equation :

$$P = 0.58 \times I_{F(AV)} + 0.0087 I_{F(RMS)}^2$$

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

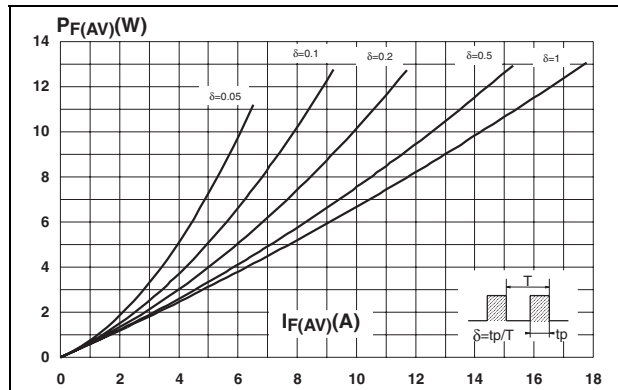


Figure 3. Average forward current versus ambient temperature (delta = 0.5, per diode)

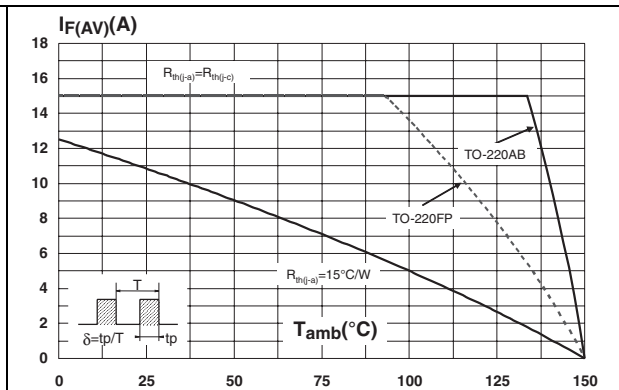


Figure 4. Normalized avalanche power derating versus pulse duration

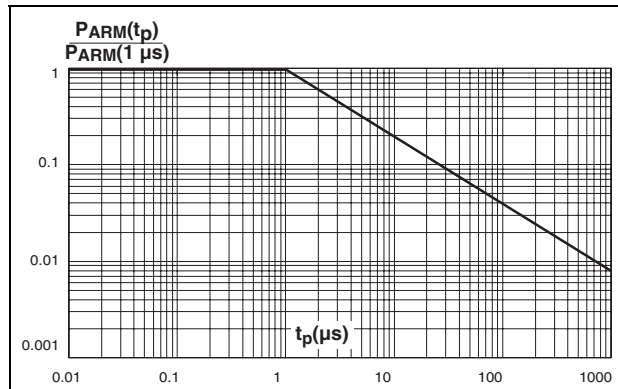


Figure 5. Normalized avalanche power derating versus junction temperature

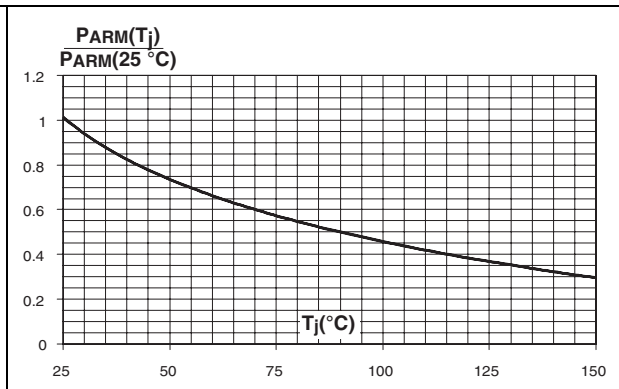


Figure 6. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)

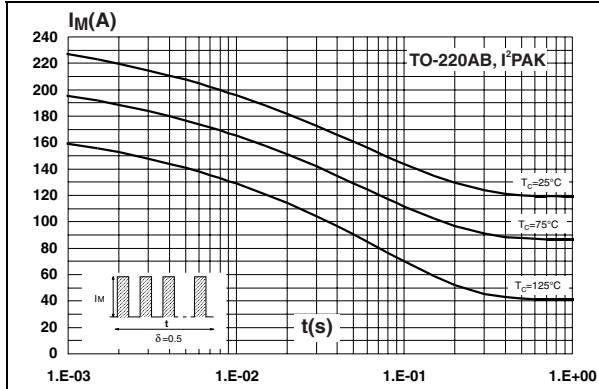


Figure 7. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)

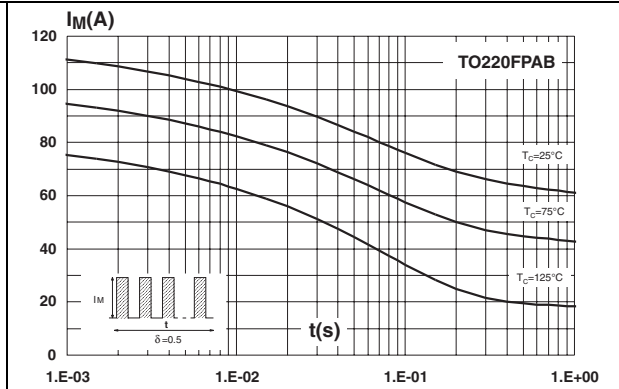


Figure 8. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB, I^2PAK)

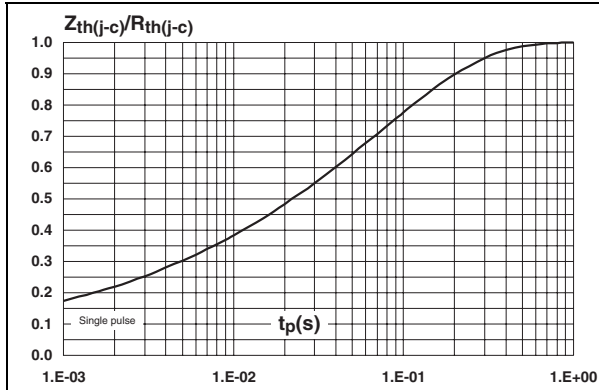


Figure 9. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

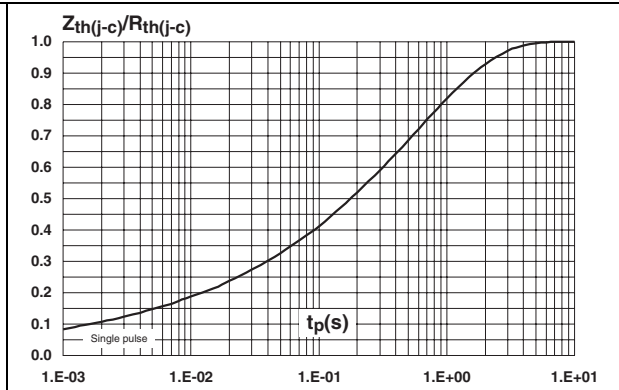


Figure 10. Reverse leakage current versus reverse voltage applied (typical values, per diode)

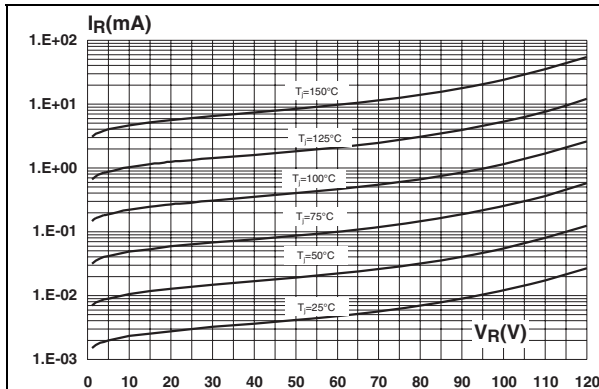


Figure 11. Junction capacitance versus reverse voltage applied (typical values, per diode)

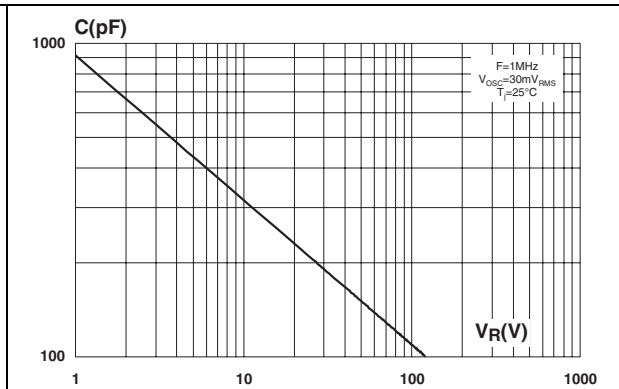


Figure 12. Forward voltage drop versus forward current (per diode)

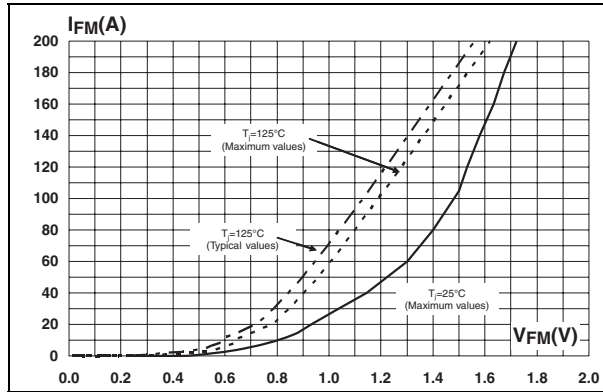
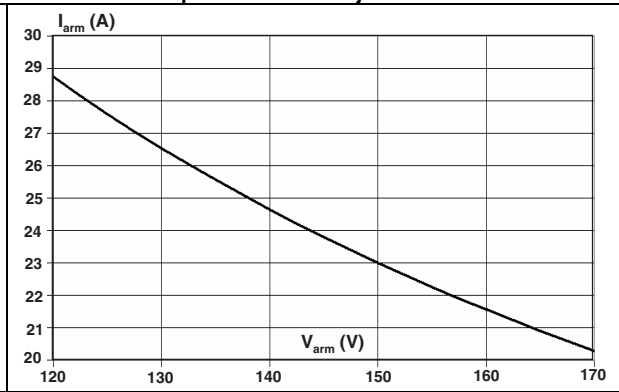


Figure 13. Reverse safe operating area (t_p < 1 μs and T_j < 150 °C)



2 Package information

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

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.

Table 5. TO-220AB 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
F2	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
G1	2.40	2.70	0.094	0.106
H2	10	10.40	0.393	0.409
L2	16.4 typ.		0.645 typ.	
L4	13	14	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.	3.75	3.85	0.147	0.151

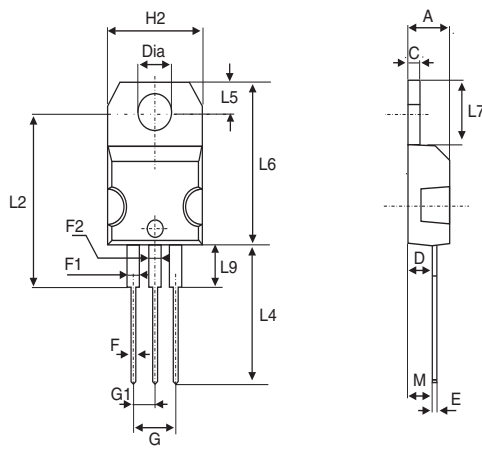


Table 6. TO-220FPAB dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.4	4.6	0.173	0.181
B	2.5	2.7	0.098	0.106
D	2.5	2.75	0.098	0.108
E	0.45	0.70	0.018	0.027
F	0.75	1	0.030	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	2.4	2.7	0.094	0.106
H	10	10.4	0.393	0.409
L2	16 Typ.		0.63 Typ.	
L3	28.6	30.6	1.126	1.205
L4	9.8	10.6	0.386	0.417
L5	2.9	3.6	0.114	0.142
L6	15.9	16.4	0.626	0.646
L7	9.00	9.30	0.354	0.366
Dia.	3.00	3.20	0.118	0.126

Table 7. I²PAK dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.40	2.72	0.094	0.107
b	0.61	0.88	0.024	0.035
b1	1.14	1.70	0.044	0.067
c	0.49	0.70	0.019	0.028
c2	1.23	1.32	0.048	0.052
D	8.95	9.35	0.352	0.368
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
E	10	10.40	0.394	0.409
L	13	14	0.512	0.551
L1	3.50	3.93	0.138	0.155
L2	1.27	1.40	0.050	0.055

3 Ordering information

Table 8. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS30L120CT	STPS30L120CT	TO-220AB	2.2 g	50	Tube
STPS30L120CFP	STPS30L120CFP	TO-220FPAB	2.0 g	50	Tube
STPS30L120CR	STPS30L120CR	I ² PAK	1.49 g	50	Tube

4 Revision history

Table 9. Document revision history

Date	Revision	Changes
28-Sep-2009	1	First issue.
17-Feb-2010	2	Updated Table 2 . Added Figure 1 and Figure 13 .
26-May-2011	3	Added I ² PAK package.

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