

Power Schottky rectifier

Table 1. Main product characteristics

$I_{F(AV)}$	2 x 5 A
V_{RRM}	120 V
$T_{j(max)}$	175° C
$V_{F(typ)}$	0.64 V

Feature and benefits

- High junction temperature capability
- Good trade-off between leakage current and forward voltage drop
- Low leakage current
- Avalanche capability specified
- Insulated package
 - TO-220FPAB
 - Insulating voltage = 2000 V
 - Typical package capacitance 12 pF

Description

Dual center tap Schottky rectifier suited for high frequency switch mode power supplies.

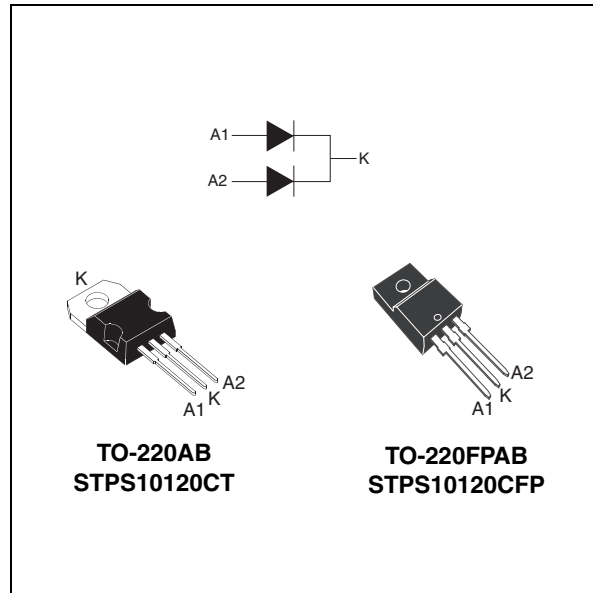


Table 2. Order code

Part number	Marking
STPS10120CT	STPS10120CT
STPS10120CFP	STPS10120CFP

Table 3. Absolute ratings (limiting values, per diode)

Symbol	Parameter			Value	Unit	
V_{RRM}	Repetitive peak reverse voltage			120	V	
$I_{F(RMS)}$	RMS forward current			30	A	
$I_{F(AV)}$	Average forward current, $\delta = 0.5$	TO-220AB	$T_c = 160^\circ\text{C}$	Per diode	5	A
			$T_c = 150^\circ\text{C}$	Per device	10	
		TO-220FPAB	$T_c = 150^\circ\text{C}$	Per diode	5	
			$T_c = 135^\circ\text{C}$	Per device	10	
I_{FSM}	Surge non repetitive forward current		$t_p = 10\text{ ms}$ Sinusoidal	120	A	
P_{ARM}	Repetitive peak avalanche power		$t_p = 1\ \mu\text{s}$ $T_j = 25^\circ\text{C}$	3000	W	
T_{stg}	Storage temperature range			-65 to + 175	° C	
T_j	Maximum operating junction temperature ⁽¹⁾			175	° C	
dV/dt	Critical rate of rise of reverse voltage			10000	V/ μs	

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

1 Characteristics

Table 4. Thermal parameters

Symbol	Parameter		Value	Unit	
$R_{th(j-c)}$	Junction to case	TO-220AB	Per diode	3.8	° C/W
			Total	2.3	
		TO-220FPAB	Per diode	6.6	
			Total	5.2	
$R_{th(c)}$	Coupling	TO-220AB	Total	0.7	
		TO-220FPAB		3.7	

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 5. Static electrical characteristics (per diode)

Symbol	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$		6	μA
		$T_j = 125^\circ\text{C}$		1	3	mA
$V_F^{(2)}$	Forward voltage drop	$T_j = 25^\circ\text{C}$	$I_F = 5\text{ A}$		0.85	V
		$T_j = 125^\circ\text{C}$		0.64	0.7	
		$T_j = 25^\circ\text{C}$	$I_F = 10\text{ A}$		0.96	
		$T_j = 125^\circ\text{C}$		0.73	0.8	

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 :

$$P = 0.60 \times I_{F(AV)} + 0.02 I_{F(RMS)}^2$$

Figure 1. Average forward power dissipation versus average forward current (per diode)

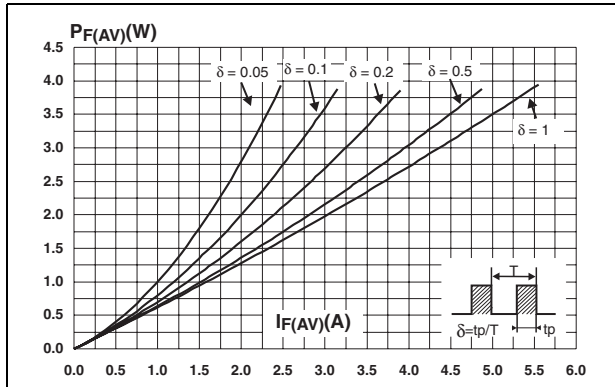


Figure 2. Average forward current versus ambient temperature (delta = 0.5, per diode)

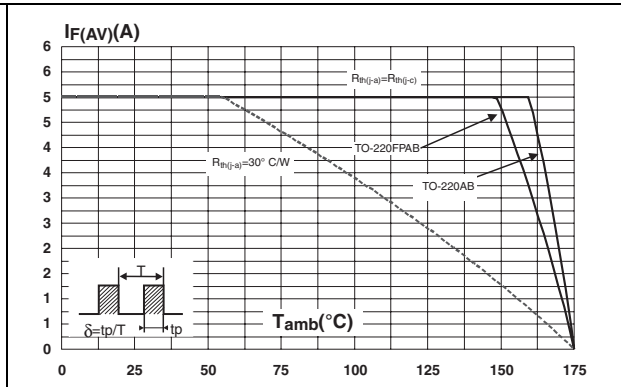


Figure 3. Normalized avalanche power derating versus pulse duration

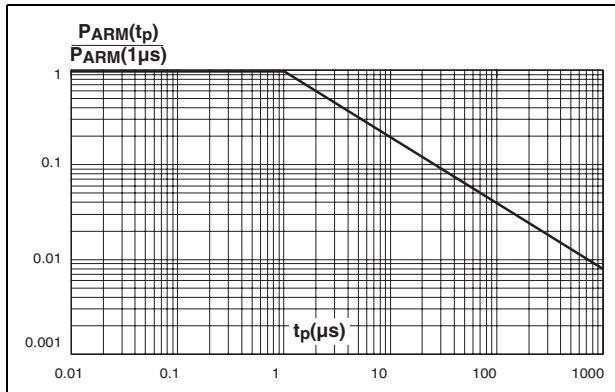


Figure 4. Normalized avalanche power derating versus junction temperature

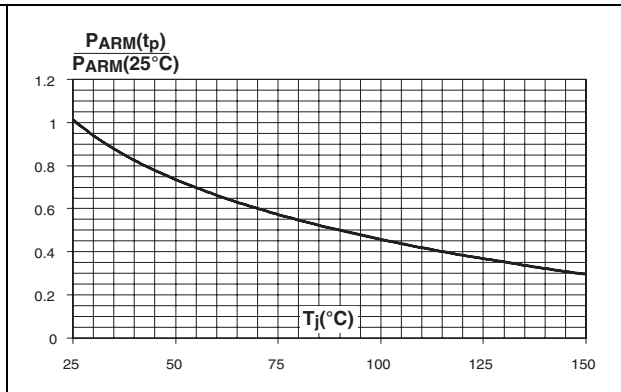


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values, per diode) (TO-220AB)

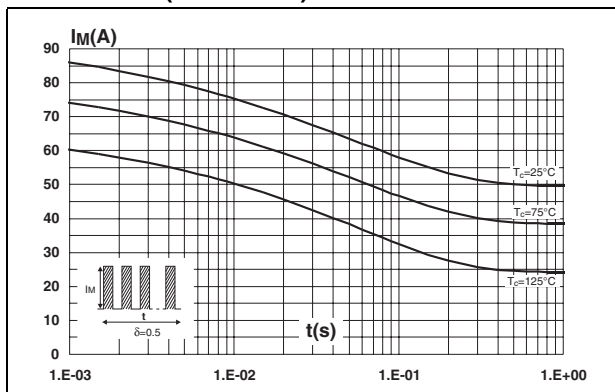


Figure 6. Non repetitive surge peak forward current versus overload duration (maximum values, per diode) (TO-220FPAB)

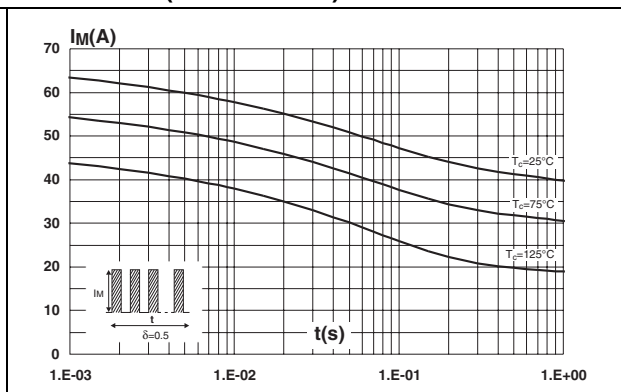


Figure 7. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB)

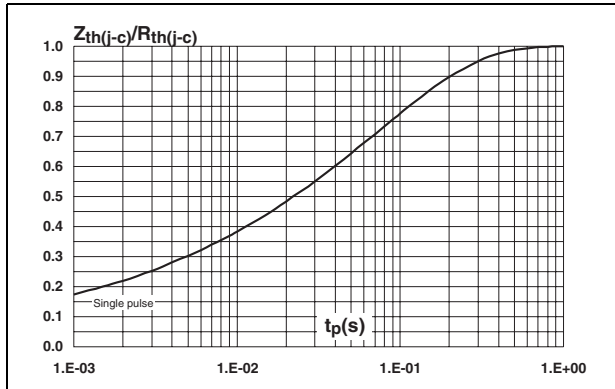


Figure 8. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

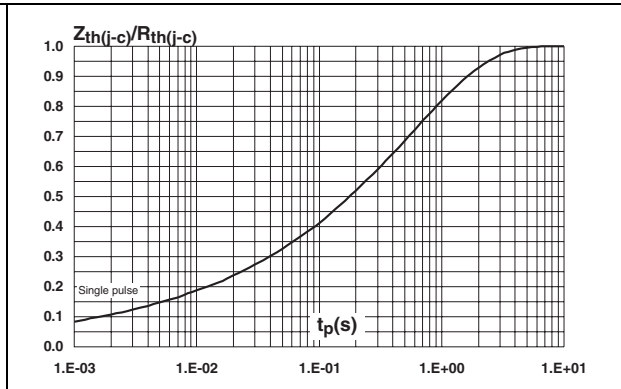


Figure 9. Reverse leakage current versus reverse voltage applied (typical values, per diode)

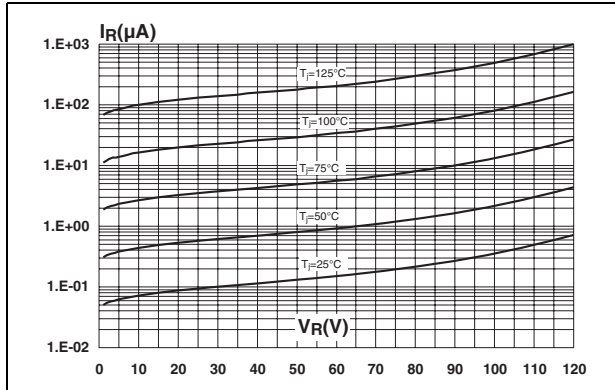


Figure 10. Junction capacitance versus reverse voltage applied (typical values, per diode)

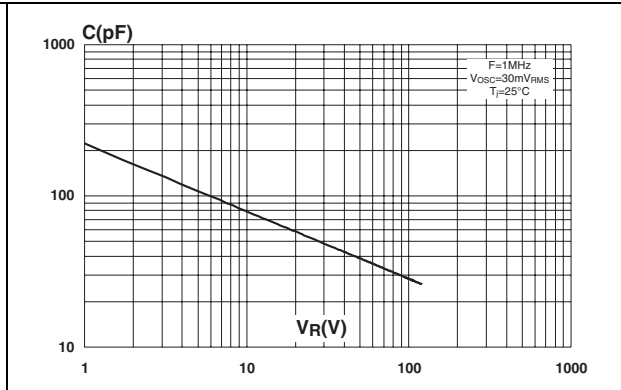
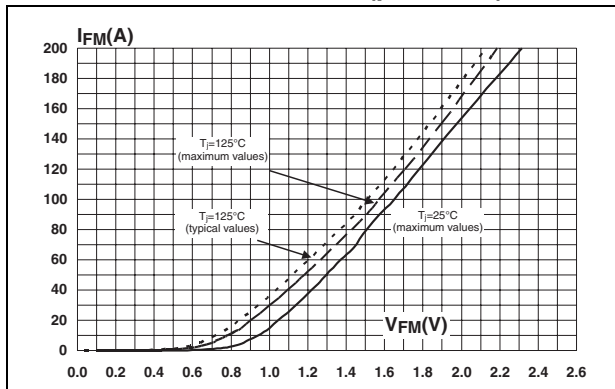


Figure 11. Forward voltage drop versus forward current (per diode)



2 Package information

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

Table 6. 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

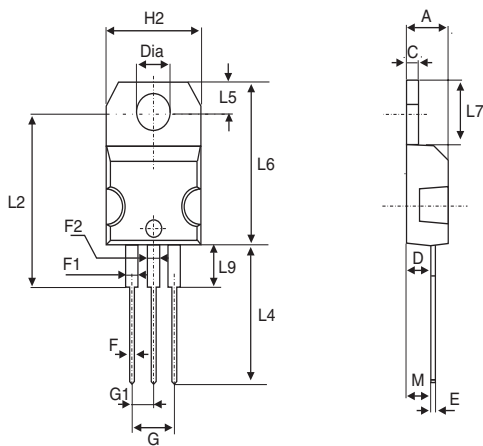


Table 7. TO-220FPAB dimensions

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

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

3 Ordering information

Table 8. Ordering information

Part number	Marking	Package	Weight	Base qty	Delivery mode
STPS10120CT	STPS10120CT	TO-220AB	2.2 g	50	Tube
STPS10120CFP	STPS10120CFP	TO-220FPAB	2.0 g	50	Tube

4 Revision history

Table 9. Revision history

Date	Revision	Changes
11-Jul-2007	1	First issue

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