

Main product characteristics

$I_{F(AV)}$	2 x 10 A
V_{RRM}	120 V
$T_{j(max)}$	175° C
$V_{F(typ)}$	0.54 V

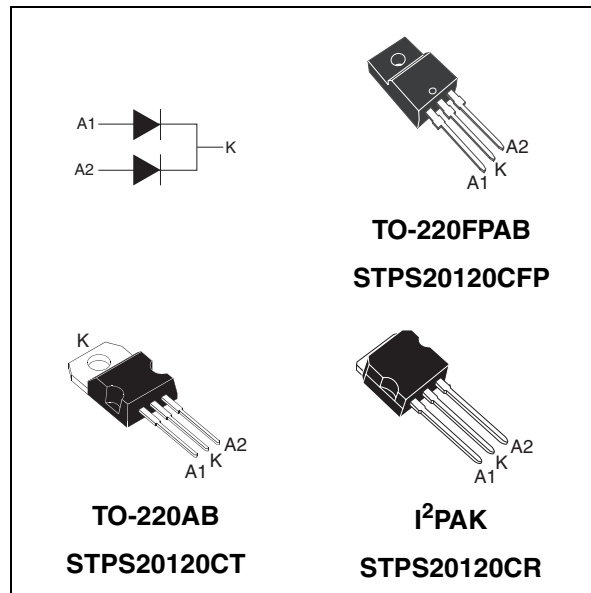
Feature and benefits

- High junction temperature capability
- Avalanche rated
- Low leakage current
- Good trade-off between leakage current and forward voltage drop

Description

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

Packaged in TO-220AB, I²PAK and TO-220FPAB, this device is intended to be used in notebook and LCD adaptors, desktop SMPS, providing in these applications a margin between the remaining voltages applied on the diode and the voltage capability of the diode.



Order code

Part Number	Marking
STPS20120CT	STPS20120CT
STPS20120CR	STPS20120CR
STPS20120CFP	STPS20120CFP

Table 1. 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, I ² PAK	$T_c = 150^\circ\text{C}$ Per diode	10	A
			$T_c = 145^\circ\text{C}$ Per device	20	
		TO-220FPAB	$T_c = 125^\circ\text{C}$ Per diode	10	
			$T_c = 100^\circ\text{C}$ Per device	20	
I_{FSM}	Surge non repetitive forward current		$t_p = 10\text{ ms}$ Sinusoidal	150	A
P_{ARM}	Repetitive peak avalanche power		$t_p = 1\ \mu\text{s}$ $T_j = 25^\circ\text{C}$	4600	W
T_{stg}	Storage temperature range		-65 to + 175	° C	
T_j	Maximum operating junction temperature ⁽¹⁾		175	° C	

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 2. Thermal parameters

Symbol	Parameter		Value	Unit	
$R_{th(j-c)}$	Junction to case	$I^2PAK / TO-220AB$	Per diode	3	$^{\circ}C/W$
			Total	1.8	
		TO-220FPAB	Per diode	5.5	
			Total	4.5	
$R_{th(c)}$	Coupling	$I^2PAK / TO-220AB$	Total	0.6	
				3.5	
		TO-220FPAB	Total	0.6	
				3.5	

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 3. Static electrical characteristics (per diode)

Symbol	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25^{\circ}C$	$V_R = V_{RRM}$		10	μA
		$T_j = 125^{\circ}C$		1.5	5	mA
$V_F^{(2)}$	Forward voltage drop	$T_j = 25^{\circ}C$	$I_F = 2.5 A$		0.7	V
		$T_j = 125^{\circ}C$		0.54	0.58	
		$T_j = 25^{\circ}C$	$I_F = 10 A$		0.92	
		$T_j = 125^{\circ}C$		0.7	0.74	
		$T_j = 25^{\circ}C$	$I_F = 20 A$		1.02	
		$T_j = 125^{\circ}C$		0.81	0.86	

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

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

To evaluate the maximum conduction losses use the following equation :

$$P = 0.62 \times I_{F(AV)} + 0.012 I_{F(RMS)}^2$$

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

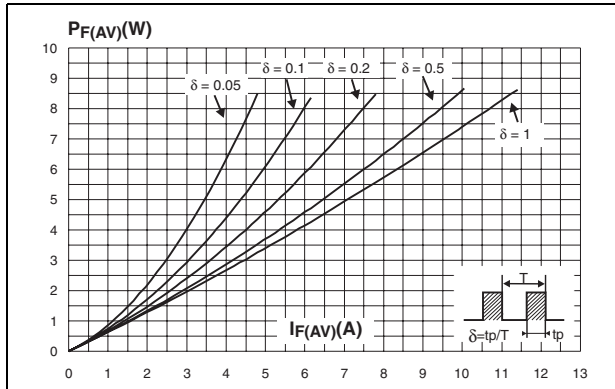


Figure 2. Average forward current versus ambient temperature (delta = 0.5, per diode)

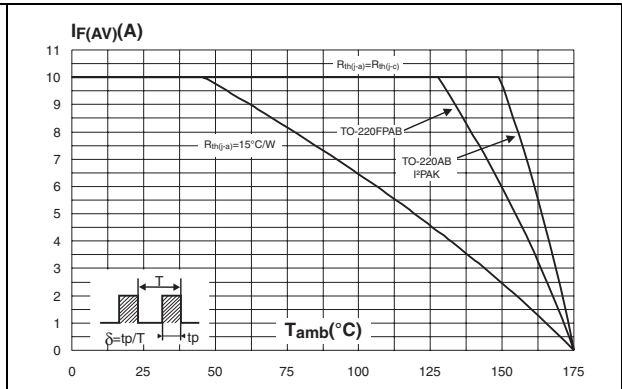


Figure 3. Normalized avalanche power derating versus pulse duration

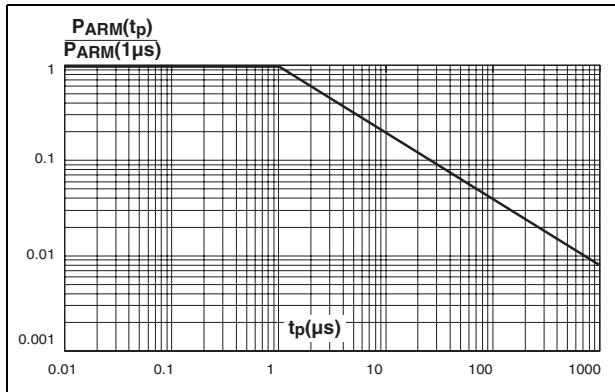


Figure 4. Normalized avalanche power derating versus junction temperature

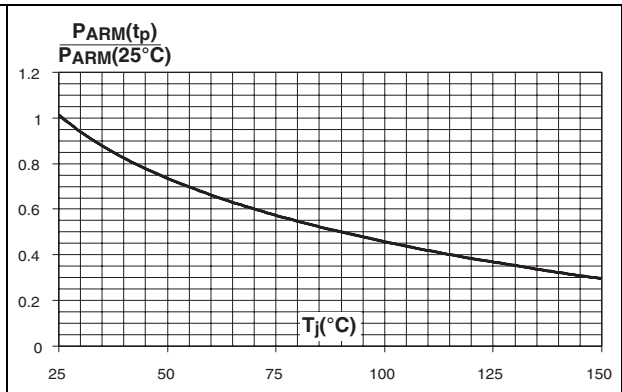


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values, per diode) (TO-220AB / I2PAK)

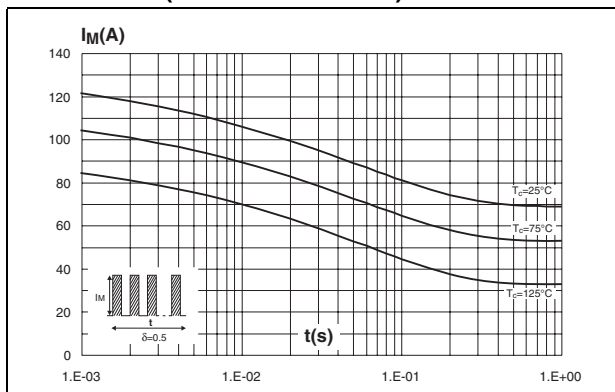


Figure 6. Non repetitive surge peak forward current versus overload duration (maximum values, per diode) (TO-220FPAB)

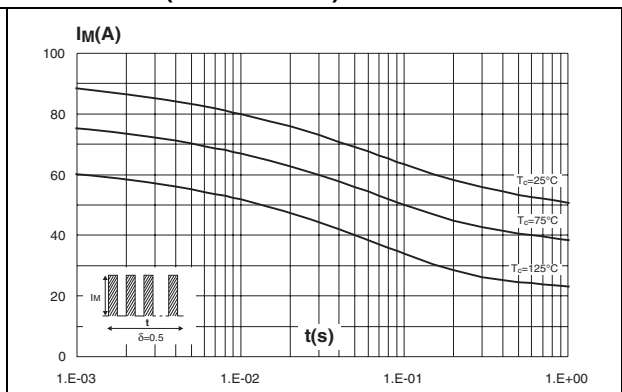


Figure 7. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB & I²PAK)

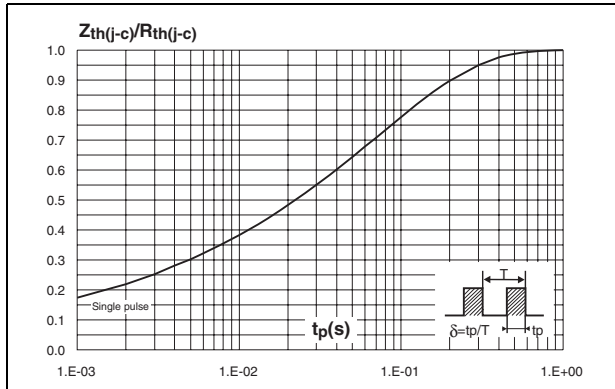


Figure 8. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

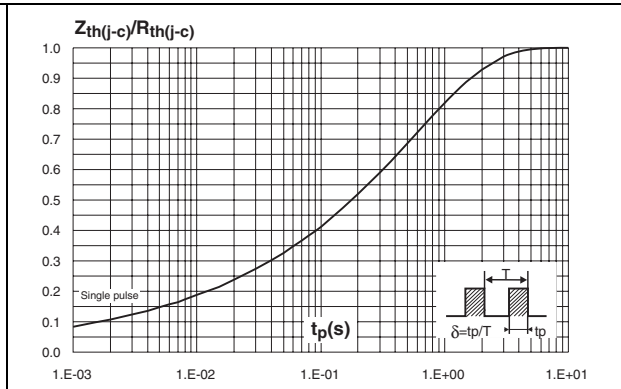


Figure 9. Reverse leakage current versus reverse voltage applied (typical values, per diode)

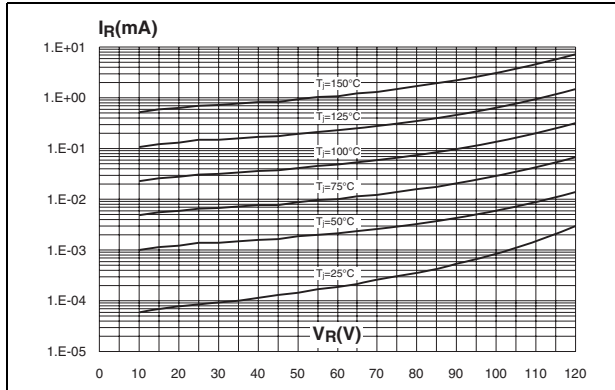


Figure 10. Junction capacitance versus reverse voltage applied (typical values, per diode)

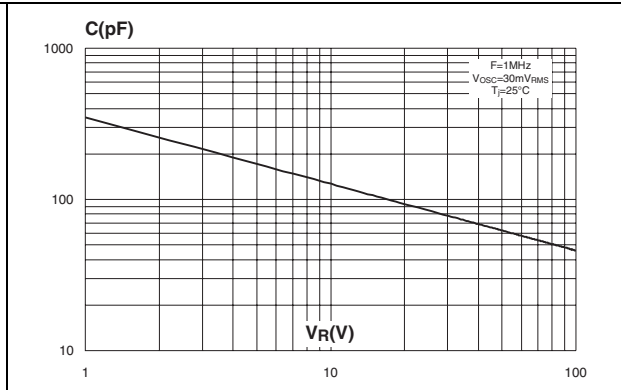
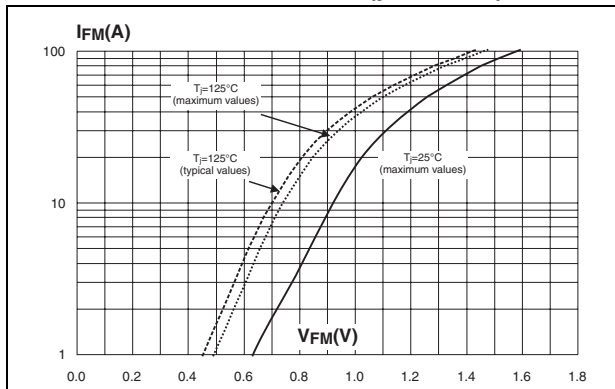


Figure 11. Forward voltage drop versus forward current (per diode)



2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 Nm
- Maximum torque value: 1.0 Nm

Table 4. 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 5. I²PAK dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.49	2.69	0.098	0.106
b	0.70	0.93	0.028	0.037
b1	1.14	1.70	0.044	0.067
b2	1.14	1.70	0.044	0.067
c	0.45	0.60	0.018	0.024
c2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
e	2.40	2.70	0.094	0.106
E	10.0	10.4	0.394	0.409
L	13.1	13.6	0.516	0.535
L1	3.48	3.78	0.137	0.149
L2	1.27	1.40	0.050	0.055

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

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

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STPS20120CT	STPS20120CT	TO-220AB	2.23 g	50	Tube
STPS20120CR	STPS20120CR	I ² PAK	1.49 g	50	Tube
STPS20120CFP	STPS20120CFP	TO-220FPAB	2.0 g	50	Tube

4 Revision history

Date	Revision	Description of Changes
18-Feb-2005	1	First issue
03-May-2007	2	Reformatted to current standards. Added TO-220FPAB package.

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