



THE DATASHEET OF STPS20120CFP



Features

- 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, TO-220AB narrow leads, 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.

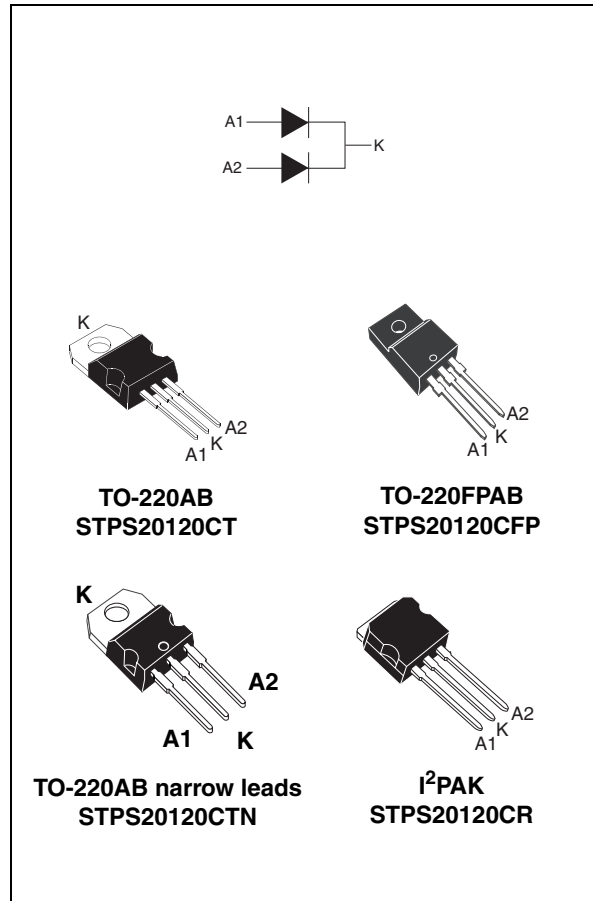


Table 1. Device summary

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

1 Characteristics

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

Symbol	Parameter			Value	Unit	
V_{RRM}	Repetitive peak reverse voltage			120	V	
$I_{F(RMS)}$	RMS forward current			30	A	
$I_{F(AV)}$	Average forward current, $\delta = 0.5$	TO-220AB, I ² PAK, TO-220AB narrow leads	$T_c = 150\text{ }^\circ\text{C}$	Per diode	10	A
			$T_c = 145\text{ }^\circ\text{C}$	Per device	20	
		TO-220FPAB	$T_c = 125\text{ }^\circ\text{C}$	Per diode	10	
			$T_c = 100\text{ }^\circ\text{C}$	Per device	20	
I_{FSM}	Surge non repetitive forward current		$t_p = 10\text{ ms}$ Sinusoidal	150	A	
P_{ARM}	Repetitive peak avalanche power		$t_p = 1\text{ }\mu\text{s}$ $T_j = 25\text{ }^\circ\text{C}$	4600	W	
T_{stg}	Storage temperature range			-65 to + 175	$^\circ\text{C}$	
T_j	Maximum operating junction temperature ⁽¹⁾			175	$^\circ\text{C}$	

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

Table 3. Thermal parameters

Symbol	Parameter			Value	Unit
$R_{th(j-c)}$	Junction to case	I ² PAK, TO-220AB, TO-220AB narrow leads	Per diode	3	$^\circ\text{C/W}$
			Total	1.8	
		TO-220FPAB	Per diode	5.5	
			Total	4.5	
$R_{th(c)}$	Coupling	I ² PAK, TO-220AB TO-220AB narrow leads	Total	0.6	
				TO-220FPAB	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 4. Static electrical characteristics (per diode)

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

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

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

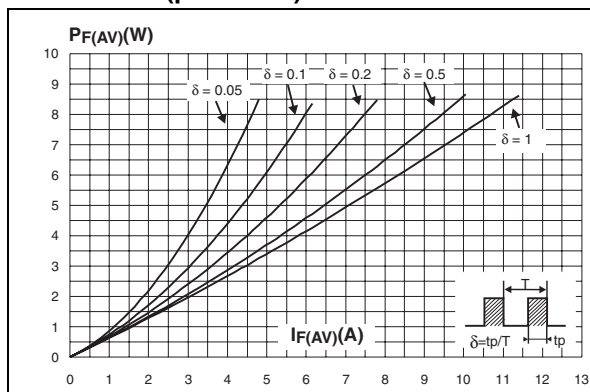


Figure 2. Average forward current versus ambient temperature (delta = 0.5, per diode)

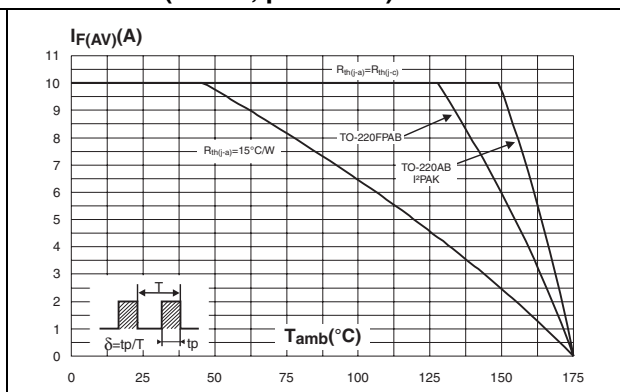


Figure 3. Normalized avalanche power derating versus pulse duration

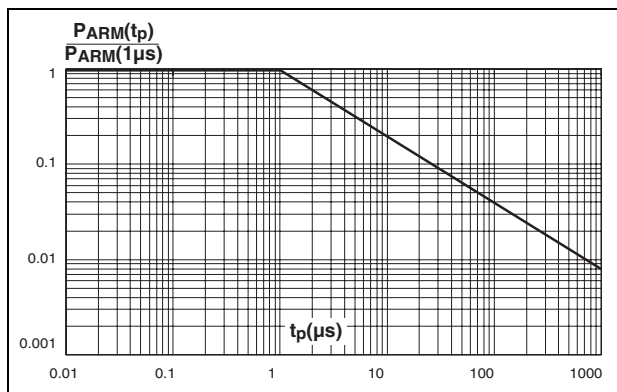


Figure 4. Normalized avalanche power derating versus junction temperature

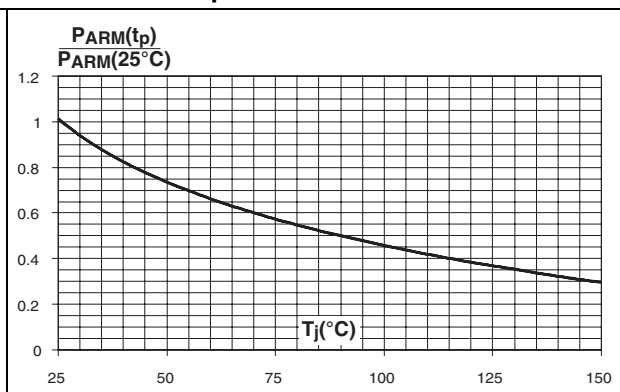


Figure 5. Relative variation of thermal impedance junction to case versus pulse duration

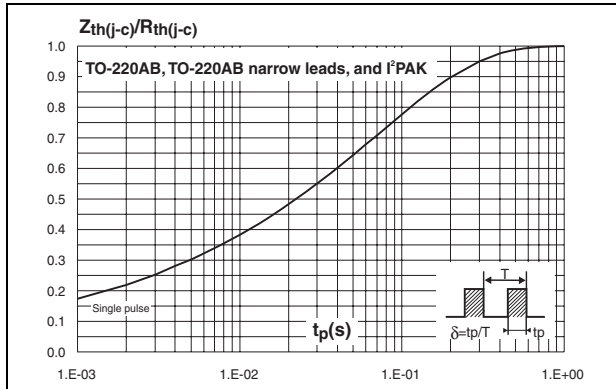


Figure 6. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

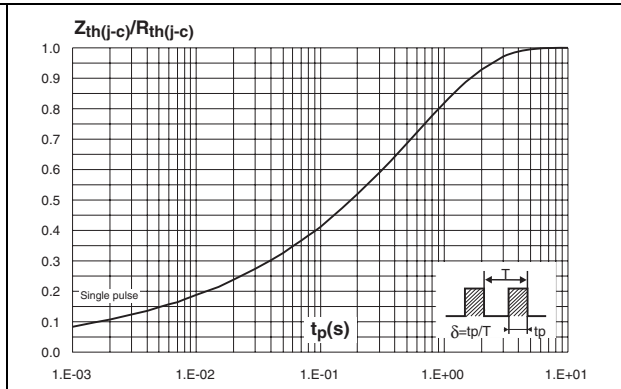


Figure 7. Reverse leakage current versus reverse voltage applied (typical values, per diode)

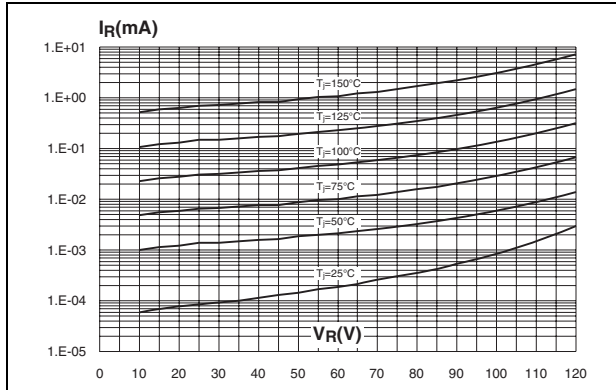


Figure 8. Junction capacitance versus reverse voltage applied (typical values, per diode)

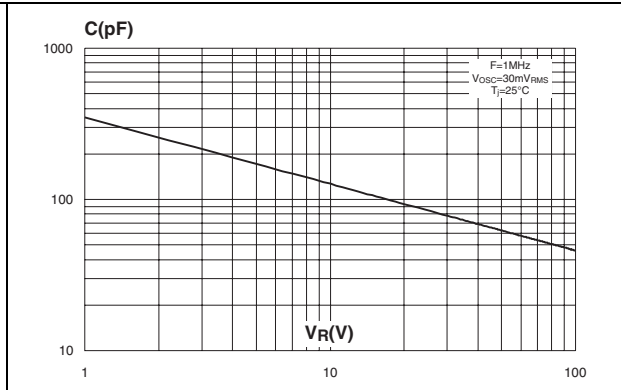
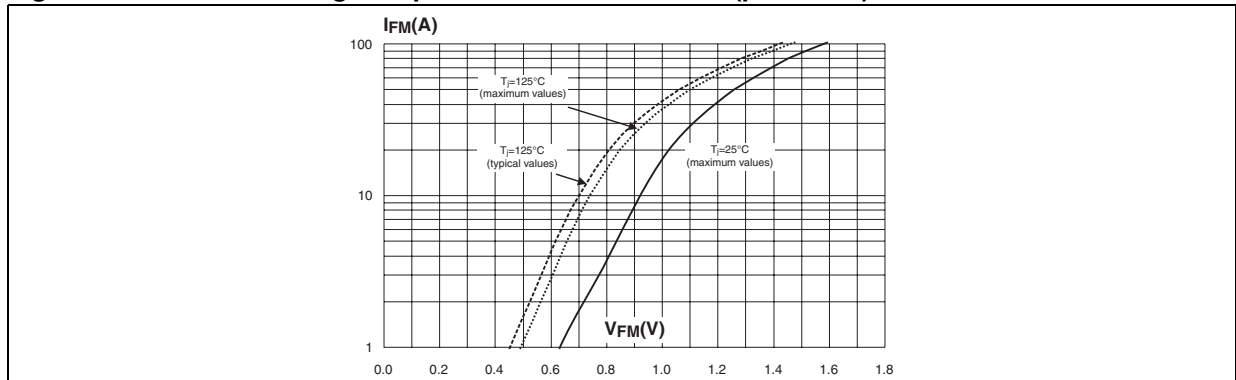


Figure 9. Forward voltage drop versus forward current (per diode)



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

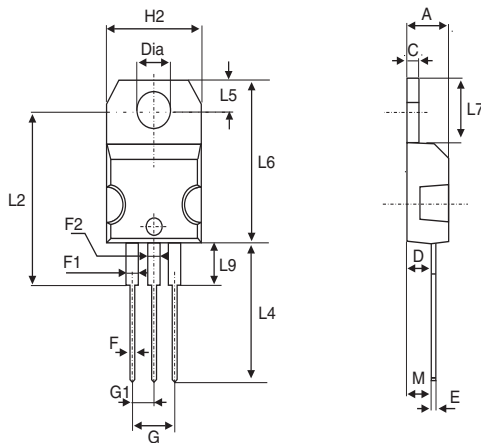
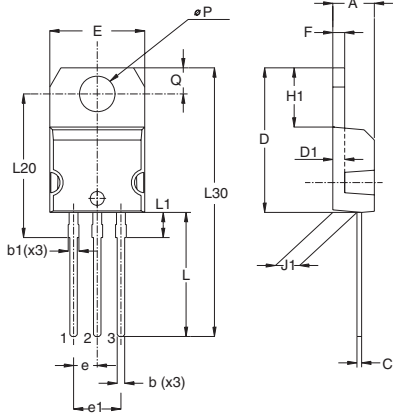


Table 6. TO-220AB narrow leads dimensions

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.17		0.18
b	0.61		0.88	0.024		0.034
b1	0.95		1.20	0.037		0.047
c	0.48		0.70	0.019		0.027
D	15.25		15.75	0.60		0.62
D1	1.27			0.05		
E	10.00		10.40	0.39		0.41
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.19		0.20
F	1.23		1.32	0.048		0.052
H1	6.20		6.60	0.24		0.26
J1	2.40		2.72	0.095		0.107
L	13.00		14.00	0.51		0.55
L1	2.60		2.90	0.102		0.114
L20	15.40			0.61		
L30	28.90			1.14		
ØP	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116



Devices in I²PAK with nickel-plated back frame must NOT be mounted by frame soldering like SMDs. Such devices are intended to be through-hole mounted ONLY and in no circumstances shall ST be held liable for any lack of performance or damage arising out of soldering of nickel-plated back frames.

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

Table 8. 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

3 Ordering information

Table 9. 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
STPS20120CTN	STPS20120CTN	TO-220AB narrow leads	1.9 g	50	Tube

4 Revision history

Table 10. Document revision history

Date	Revision	Changes
18-Feb-2005	1	First issue
03-May-2007	2	Reformatted to current standards. Added TO-220FPAB package.
15-Jun-2012	3	Added TO-220 narrow leads package.

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