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STPS30120C

Power Schottky rectifier

Features

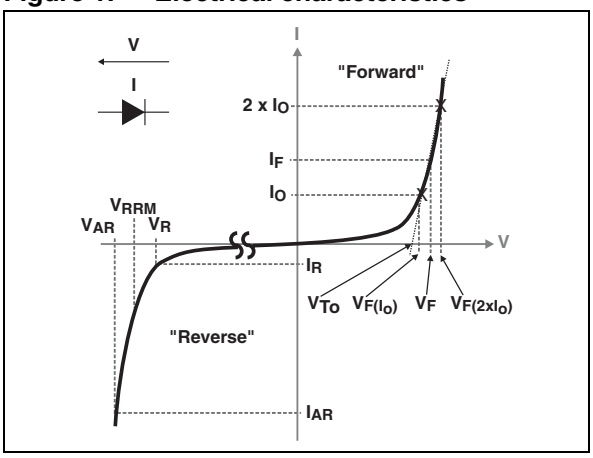
- High junction temperature capability
- Avalanche rated
- Low leakage current
- Good trade-off between leakage current and forward voltage drop

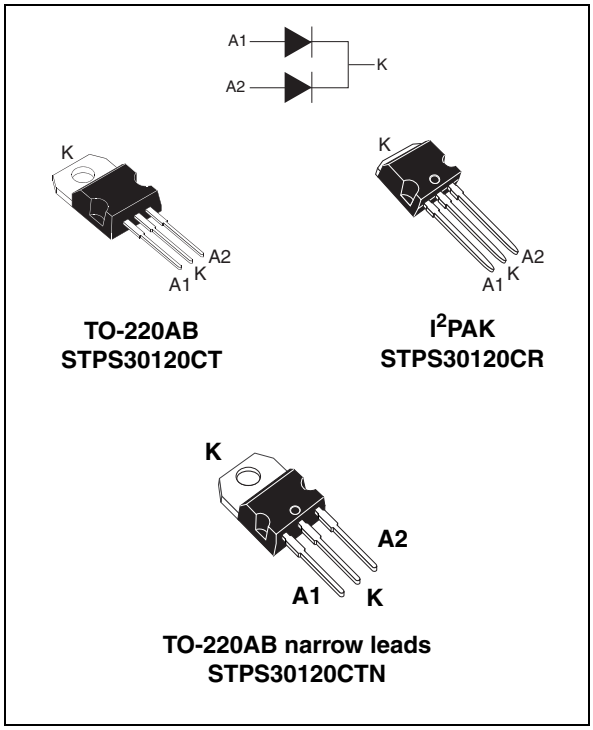
Description

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

Packaged in TO-220AB, TO-220AB narrow leads, and I^2PAK, 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.

Figure 1. Electrical characteristics (a)





TO-220AB
STPS30120CT

I^2PAK
STPS30120CR

TO-220AB narrow leads
STPS30120CTN

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 x 15 A
V_{RRM}	120 V
$T_{j(max)}$	175 °C
$V_{F(typ)}$	0.57 V

a. 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.

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	$\delta = 0.5$ $T_c = 145$ °C	Per diode Per device	15 30	A
I_{FSM}	Surge non repetitive forward current		$t_p = 10$ ms sinusoidal	180	A
P_{ARM}	Repetitive peak avalanche power		$t_p = 1$ µs $T_j = 25$ °C	6700	W
V_{ARM}(1)	Maximum repetitive peak avalanche voltage	$t_p = 1$ µs, $T_j < 150$ °C, $I_{AR} < 13.4$ A		150	V
V_{ASM}(1)	Maximum single pulse peak avalanche voltage	$t_p = 1$ µs, $T_j < 150$ °C, $I_{AR} < 13.4$ A		150	V
T_{stg}	Storage temperature range			-65 to + 175	°C
T_j	Maximum operating junction temperature(2)			175	°C

1. Refer to *Figure 10*
2. $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ 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	Per diode Total	2.2 1.3	°C/W
$R_{th(c)}$	Coupling	Total	0.3	°C/W

When the diodes 1 and 2 are used simultaneously :
T_j(diode 1) = P(diode 1) x $R_{th(j-c)}$(per diode) + P(diode 2) x $R_{th(c)}$

Table 4. Static electrical characteristics (per diode)

Symbol	Test conditions			Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$			15	µA
		T_j = 125 °C			2.5	7.5	mA
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 5 A			0.74	V
		T_j = 125 °C			0.57	0.61	
		T_j = 25 °C	I_F = 15 A			0.92	
		T_j = 125 °C			0.7	0.74	
		T_j = 25 °C	I_F = 30 A			1.02	
		T_j = 125 °C			0.83	0.89	

1. Pulse test : tp = 5 ms, δ < 2%
2. Pulse test : tp = 380 µs, δ < 2%

To evaluate the maximum conduction losses use the following equation :
$P = 0.59 \times I_{F(AV)} + 0.01\ I_F{}^2{}_{(RMS)}$

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

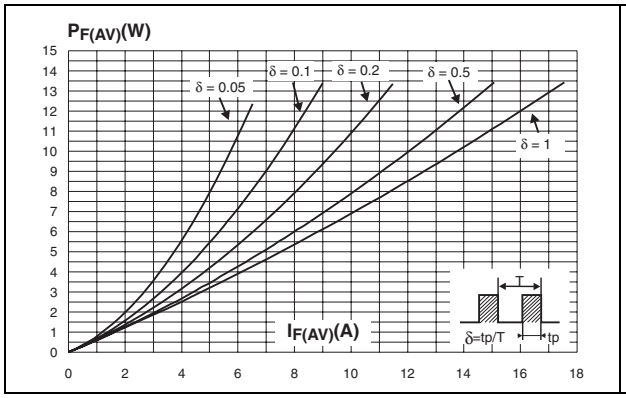


Figure 3. Average forward current versus ambient temperature (δ = 0.5, per diode)

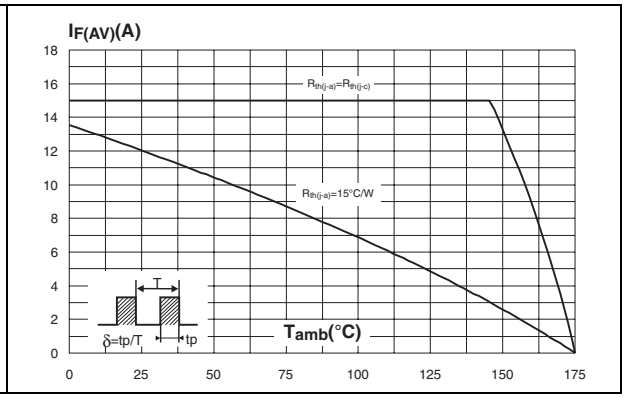


Figure 4. Normalized avalanche power derating versus pulse duration

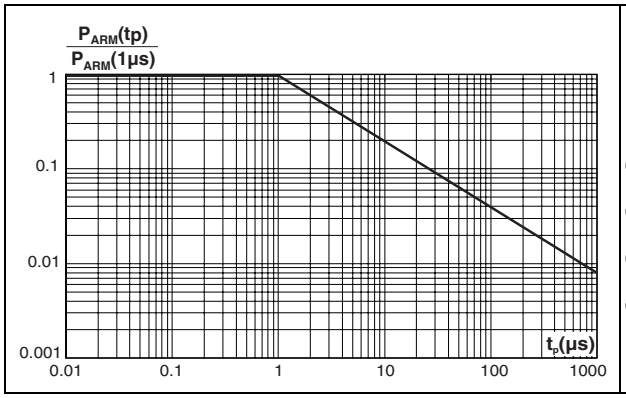


Figure 5. Normalized avalanche power derating versus junction temperature

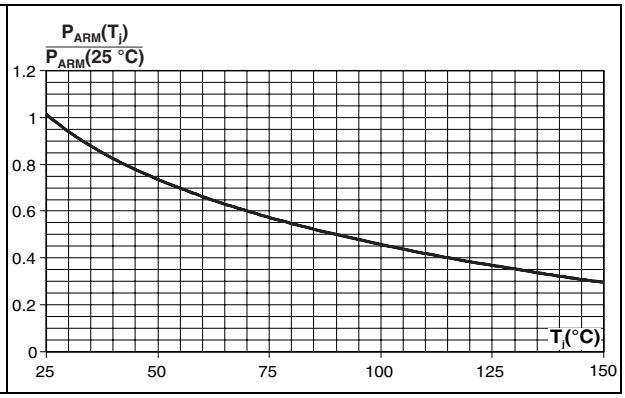


Figure 6. Relative variation of thermal impedance junction to ambient versus pulse duration

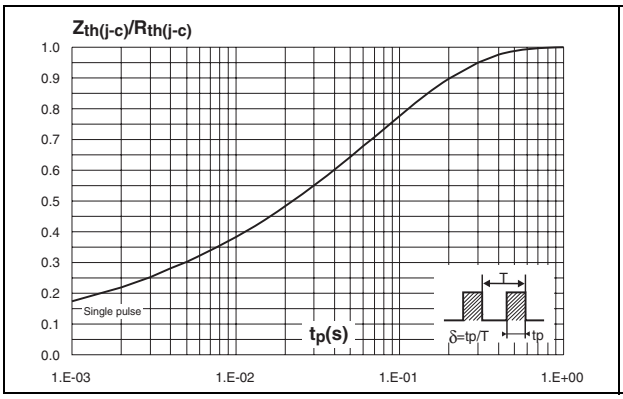


Figure 7. Reverse leakage current versus reverse voltage applied (typical values, per diode)

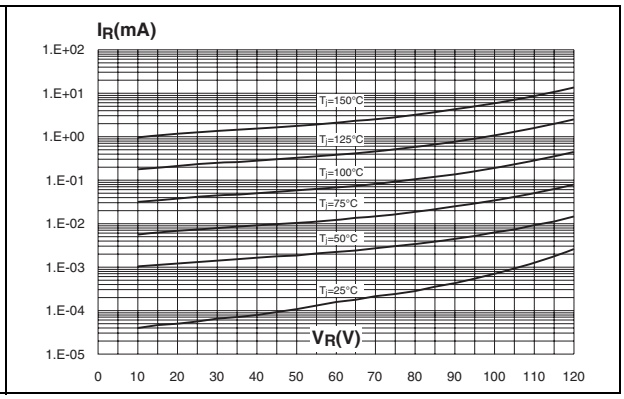


Figure 8. Junction capacitance versus reverse voltage applied (typical values, per diode)

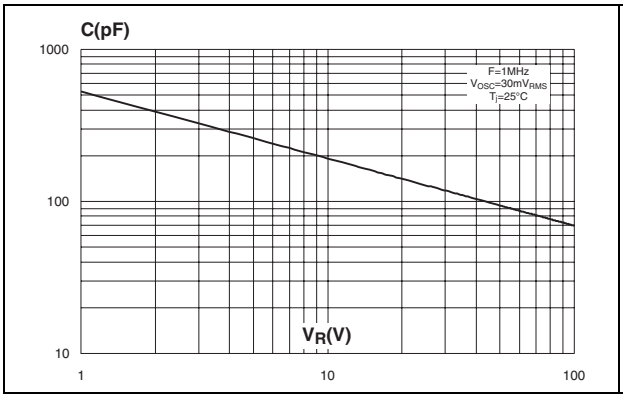


Figure 9. Forward voltage drop versus forward current (per diode)

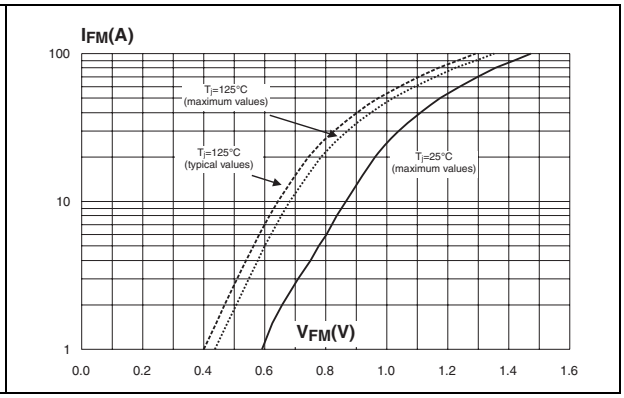
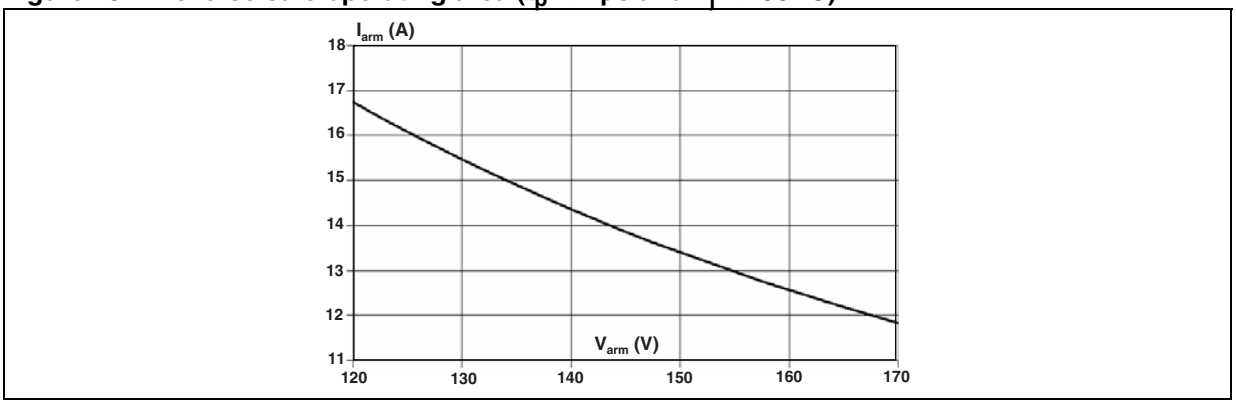


Figure 10. Reverse safe operating area (t_p < 1 µs and T_j < 150 °C)

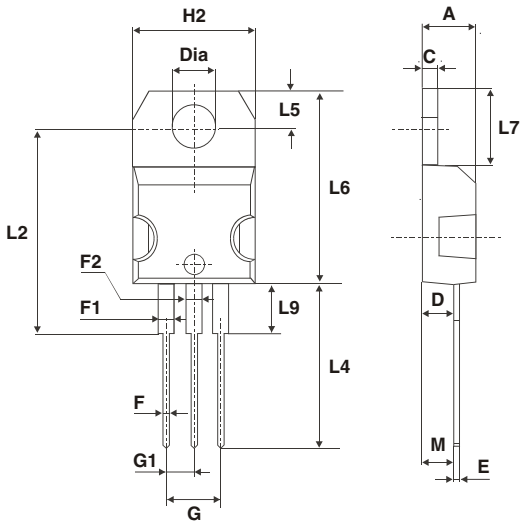


2 Package information

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

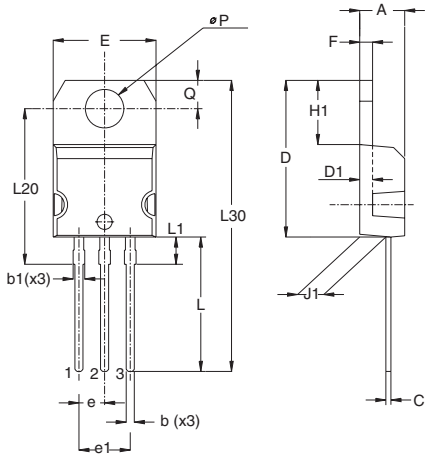
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

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

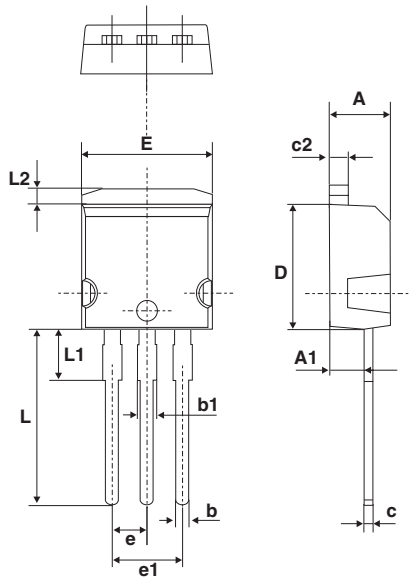
Table 6. TO-220AB narrow leads dimensions



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 I^2PAK 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. I^2PAK 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
STPS30120CT	STPS30120CT	TO-220AB	2.23 g	50	Tube
STPS30120CR	STPS30120CR	I^2PAK	1.49 g	50	Tube
STPS30120CTN	STPS30120CTN	TO-220AB narrow leads	1.9 g	50	Tube

4 Revision history

Table 9. Document revision history

Date	Revision	Changes
18-Feb-2005	1	First issue.
23-Nov-2006	2	Reformatted to current standards. Added I^2PAK package.
17-Feb-2010	3	Updated *Table 2*. Added *Figure 1* and *Figure 10.*
13-Jan-2012	4	Added TO-220AB narrow leads package.