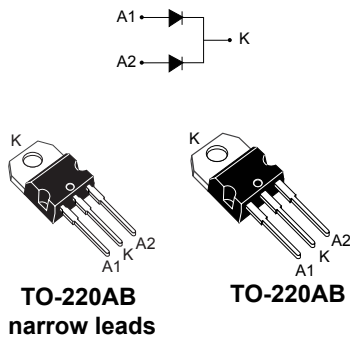


120 V power Schottky rectifier



Features

- High junction temperature capability
- Avalanche rated
- Low leakage current
- Good trade-off between leakage current and forward voltage drop
- ECOPACK®2 compliant

Applications

- Switching diode
- SMPS
- DC/DC converter
- LED lighting

Description

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

Packaged in TO-220AB and TO-220AB narrow leads, the STPS30120C is optimized for use in notebook adaptors, LCD adaptors and desktop SMPS, providing in these applications a margin between the remaining voltages applied on the diode and the voltage capability of the diode.

Product status link	
STPS30120C	
Product summary	
Symbol	Value
$I_{F(AV)}$	2 x 15 A
V_{RRM}	120 V
T_j (max.)	175 °C
V_F (typ.)	0.70 V

1 Characteristics

Table 1. Absolute ratings (limiting values at 25 °C, per diode, unless otherwise specified)

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 , $\delta = 0.5$	$T_c = 145\text{ °C}$	Per diode	15	A
		$T_c = 140\text{ °C}$	Per device	30	
I_{FSM}	Surge non repetitive forward current		$t_p = 10\text{ ms}$ sinusoidal	180	A
P_{ARM}	Repetitive peak avalanche power		$t_p = 10\text{ }\mu\text{s}$, $T_j = 125\text{ °C}$	480	W
T_{stg}	Storage temperature range		-65 to +175	°C	
T_j	Maximum operating junction temperature ⁽¹⁾		175	°C	

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

Table 2. Thermal resistance parameters

Symbol	Parameter		Max. value	Unit
$R_{th(j-c)}$	Junction to case	Per diode	2.2	°C/W
		Total	1.3	
$R_{th(c)}$	Coupling		0.3	

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 3. Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-		15	μA
		$T_j = 125\text{ °C}$		-	2.5	7.5	mA
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 5\text{ A}$	-		0.74	V
		$T_j = 125\text{ °C}$		-	0.57	0.61	
		$T_j = 25\text{ °C}$	$I_F = 15\text{ A}$	-		0.92	
		$T_j = 125\text{ °C}$		-	0.70	0.74	
		$T_j = 25\text{ °C}$	$I_F = 30\text{ A}$	-		1.02	
		$T_j = 125\text{ °C}$		-	0.83	0.89	

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 conduction losses, use the following equation:

$$P = 0.59 \times I_{F(AV)} + 0.01 \times I_{F(RMS)}^2$$

For more information, please refer to the following application notes related to the power losses :

- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

1.1 Characteristics (curves)

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

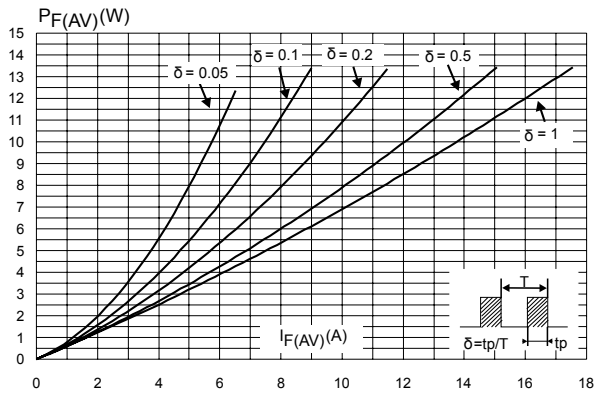


Figure 2. Average forward current versus ambient temperature ($\delta = 0.5$, per diode)

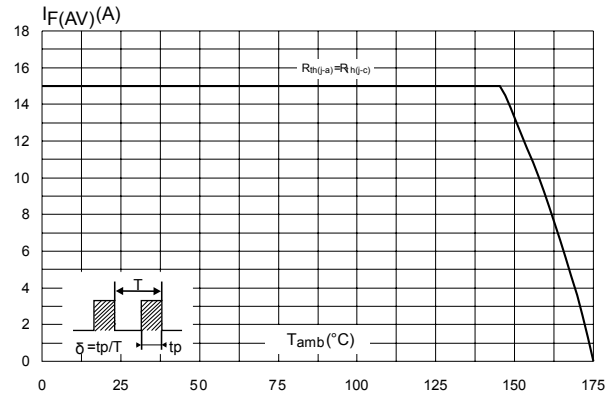


Figure 3. Normalized avalanche power derating versus pulse duration ($T_j = 125^\circ\text{C}$)

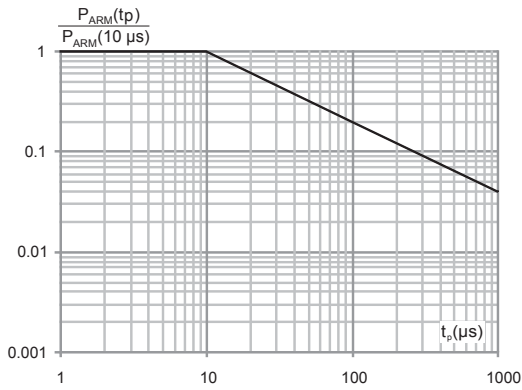


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

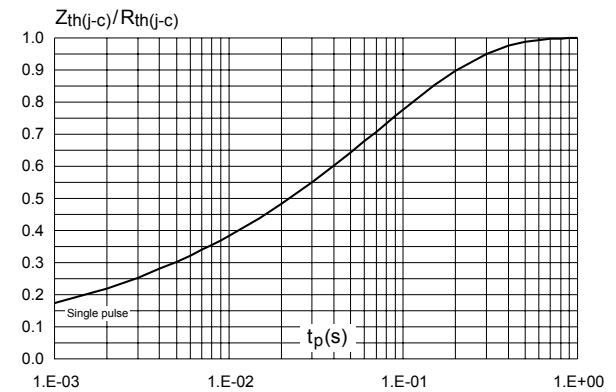


Figure 5. Reverse leakage current versus reverse voltage applied (typical values, per diode)

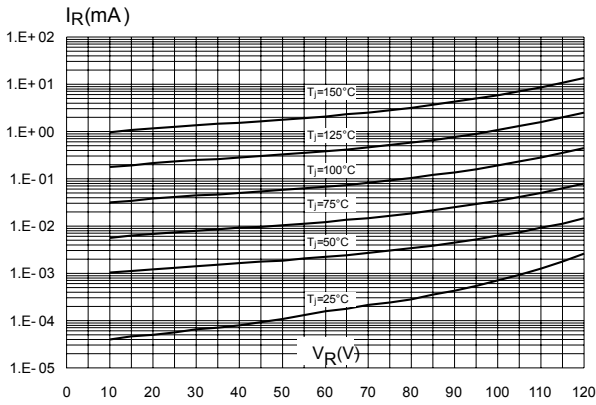


Figure 6. Junction capacitance versus reverse voltage applied (typical values, per diode)

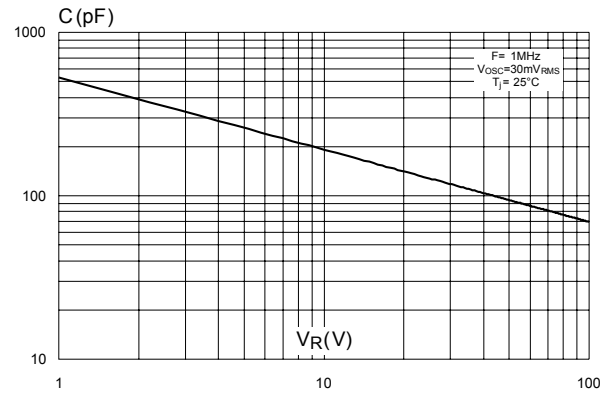
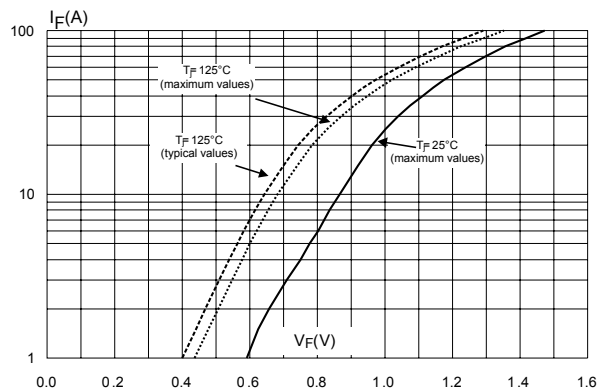


Figure 7. Forward voltage drop versus forward current (per diode)



2 Package information

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.

2.1 TO-220AB package information

- Epoxy meets UL 94,V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.70 N·m

Figure 8. TO-220AB package outline

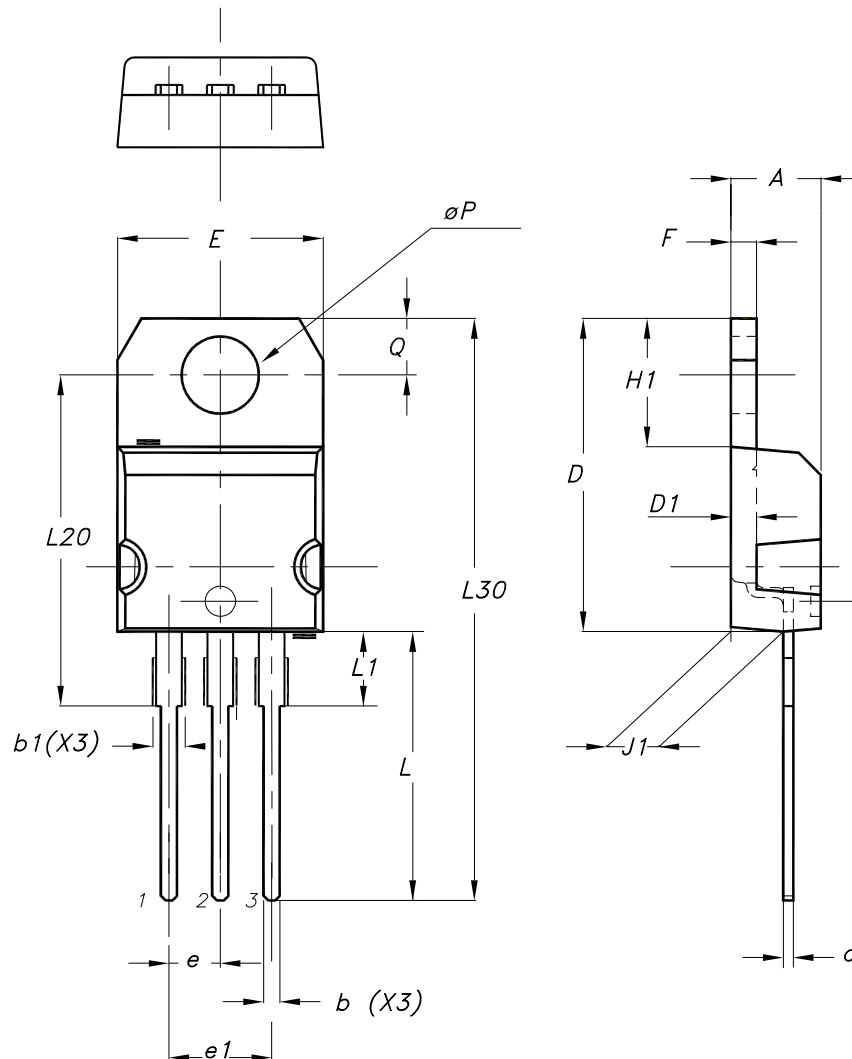


Table 4. TO-220AB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
b	0.61	0.88	0.240	0.035
b1	1.14	1.55	0.045	0.061
c	0.48	0.70	0.019	0.028
D	15.25	15.75	0.600	0.620
D1	1.27 typ.		0.050 typ.	
E	10.00	10.40	0.394	0.409
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
F	1.23	1.32	0.048	0.052
H1	6.20	6.60	0.244	0.260
J1	2.40	2.72	0.094	0.107
L	13.00	14.00	0.512	0.551
L1	3.50	3.93	0.138	0.155
L20	16.40 typ.		0.646 typ.	
L30	28.90 typ.		1.138 typ.	
θP	3.75	3.85	0.148	0.152
Q	2.65	2.95	0.104	0.116

2.2 TO-220AB narrow leads package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.70 N·m

Figure 9. TO-220AB narrow leads package outline

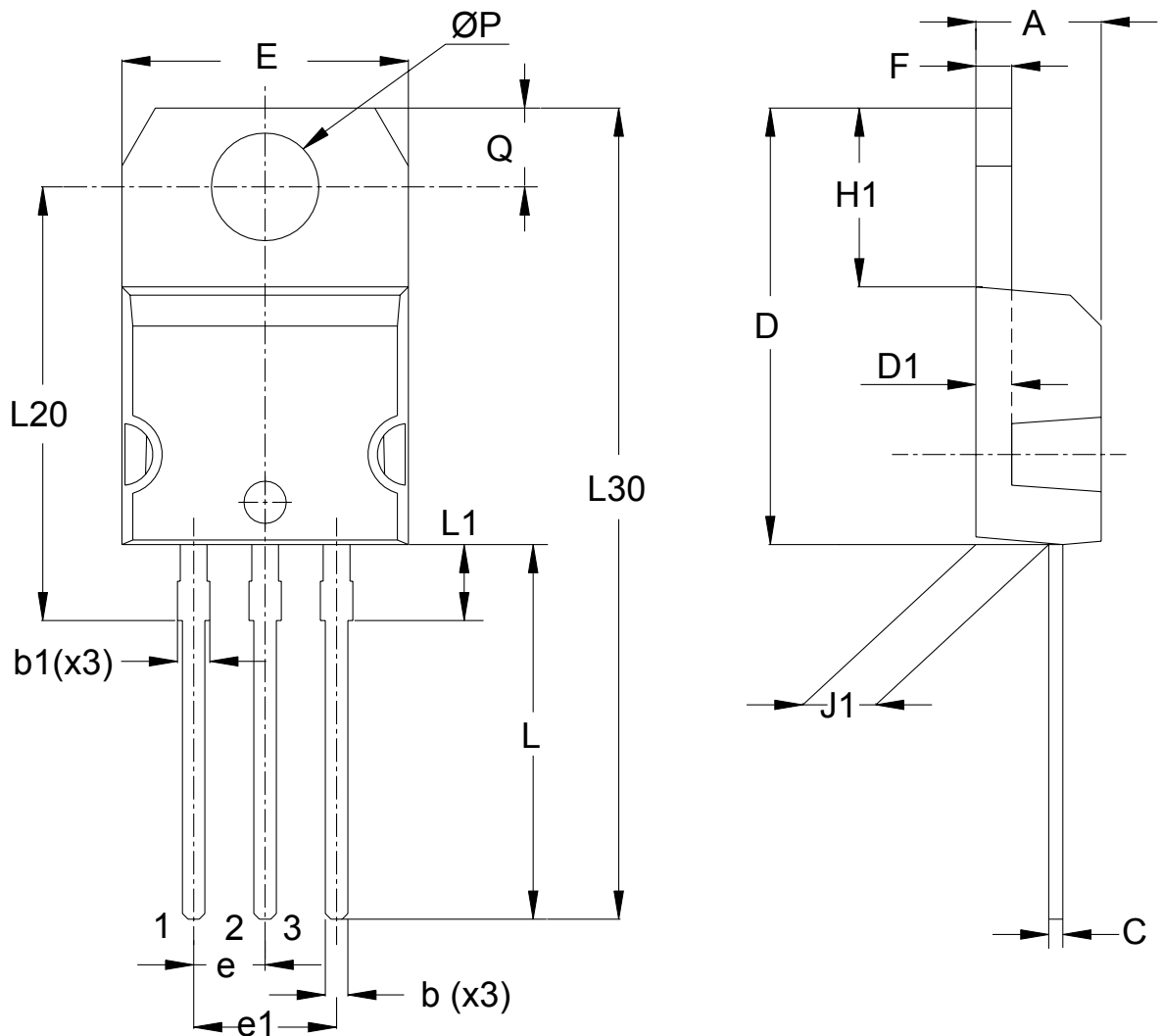


Table 5. TO-220AB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
b	0.61	0.88	0.240	0.035
b1	0.95	1.20	0.037	0.047

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
c	0.48	0.70	0.019	0.028
D	15.25	15.75	0.600	0.620
D1	1.27 typ.		0.050 typ.	
E	10.00	10.40	0.394	0.409
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
F	1.23	1.32	0.048	0.052
H1	6.20	6.60	0.244	0.260
J1	2.40	2.72	0.094	0.107
L	13.00	14.00	0.512	0.551
L1	2.60	2.90	0.138	0.155
L20	15.40 typ.		0.646 typ.	
L30	28.90 typ.		1.138 typ.	
θP	3.75	3.85	0.148	0.152
Q	2.65	2.95	0.104	0.116

3 Ordering Information

Table 6. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS30120CT	STPS30120CT	TO-220AB	1.95 g	50	Tube
STPS30120CTN	STPS30120CTN	TO-220AB narrow leads	1.90 g	50	Tube

Revision history

Table 7. Document revision history

Date	Version	Changes
18-Feb-2005	1	First issue
23-Nov-2006	2	Reformatted to current standards. Added I ² PAK package.
17-Feb-2010	3	Updated Table 2. Added Figure 1 and Figure 10.
13-Jan-2012	4	Added TO-220AB narrow leads package.
01-Jun-2018	5	<p>Removed I²PAK package.</p> <p>Updated Table 1. Absolute ratings (limiting values at 25 °C, per diode, unless otherwise specified).</p> <p>Removed figure 1, figure 5 and figure 10.</p> <p>Updated Section 1.1 Characteristics (curves) and Table 4. TO-220AB package mechanical data.</p> <p>Minor text changes to improve readability.</p>

IMPORTANT NOTICE – PLEASE READ CAREFULLY

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2018 STMicroelectronics – All rights reserved