

# 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 <sup>(1)</sup>			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	$\mu\text{A}$
		$T_j = 125\text{ °C}$		-	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:

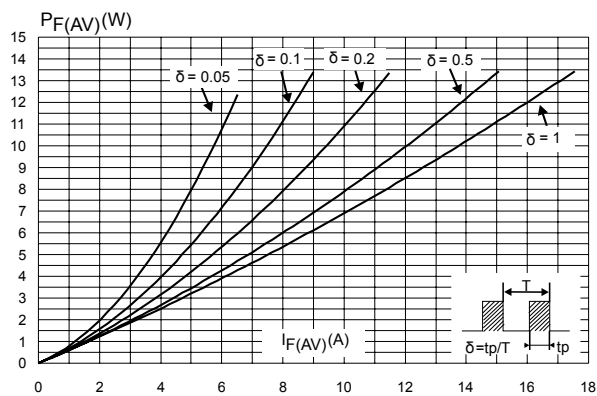
$$P = 0.59 \times I_{F(AV)} + 0.01 \times I_{F(RMS)}^2$$

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

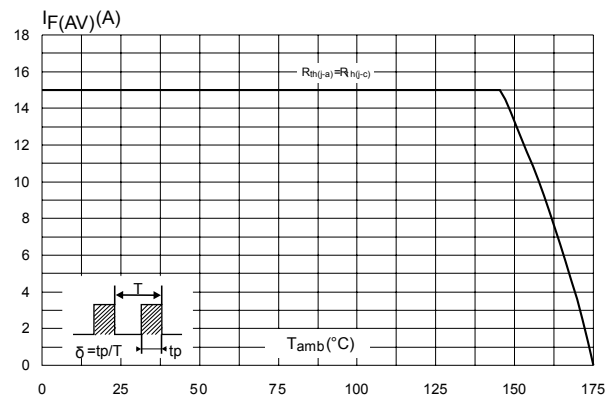
- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

## 1.1 Characteristics (curves)

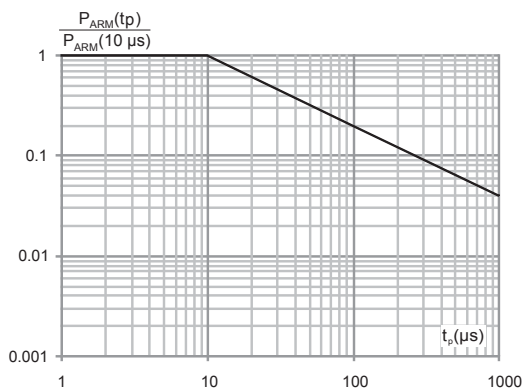
**Figure 1. Average forward power dissipation versus average forward current (per diode)**



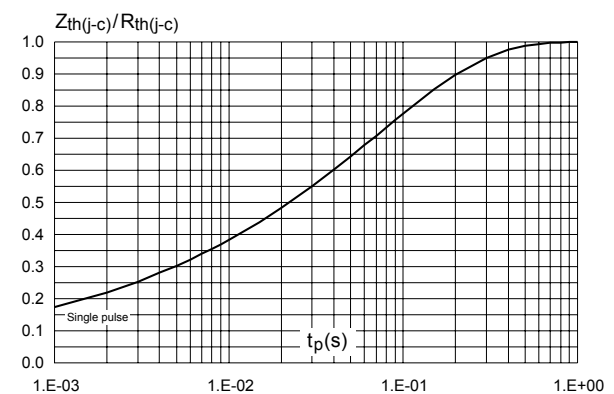
**Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)**



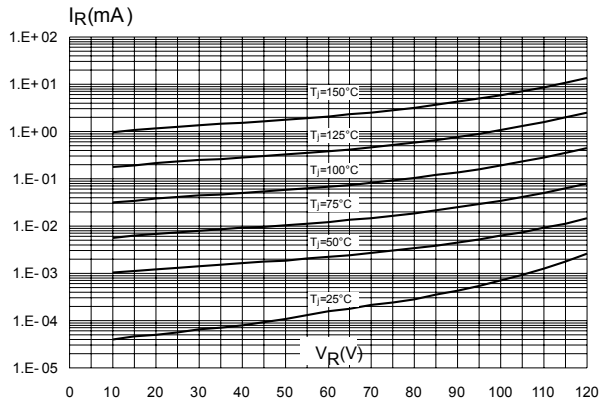
**Figure 3. Normalized avalanche power derating versus pulse duration ( $T_j = 125^\circ\text{C}$ )**



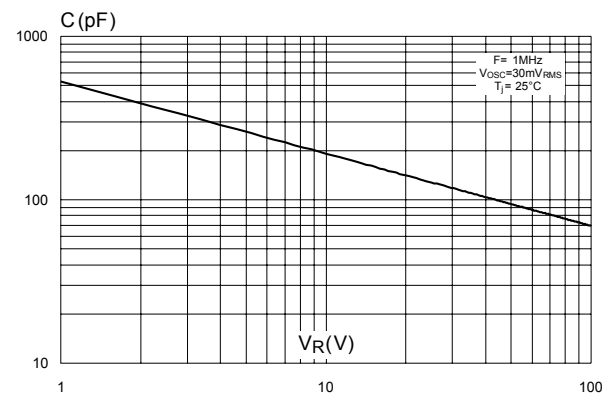
**Figure 4. Relative variation of thermal impedance junction to case versus pulse duration**



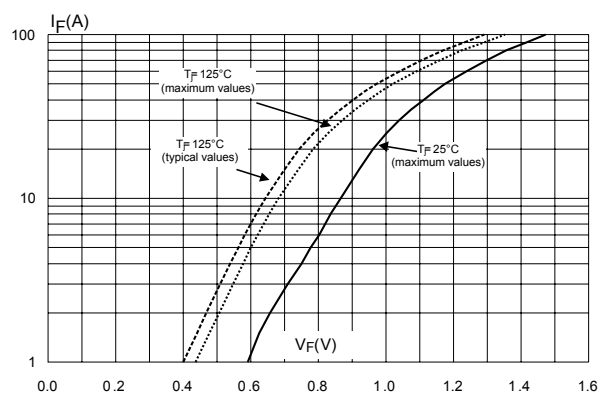
**Figure 5. Reverse leakage current versus reverse voltage applied (typical values, per diode)**



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



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



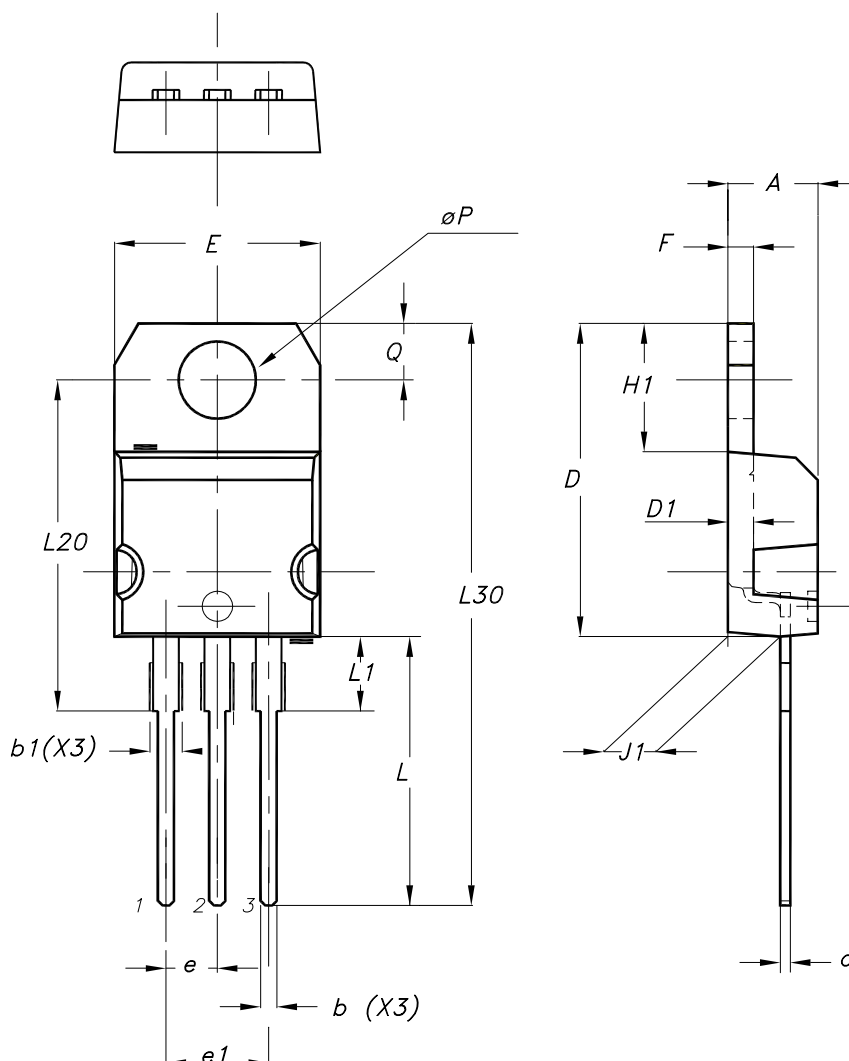
## 2 Package information

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](http://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**



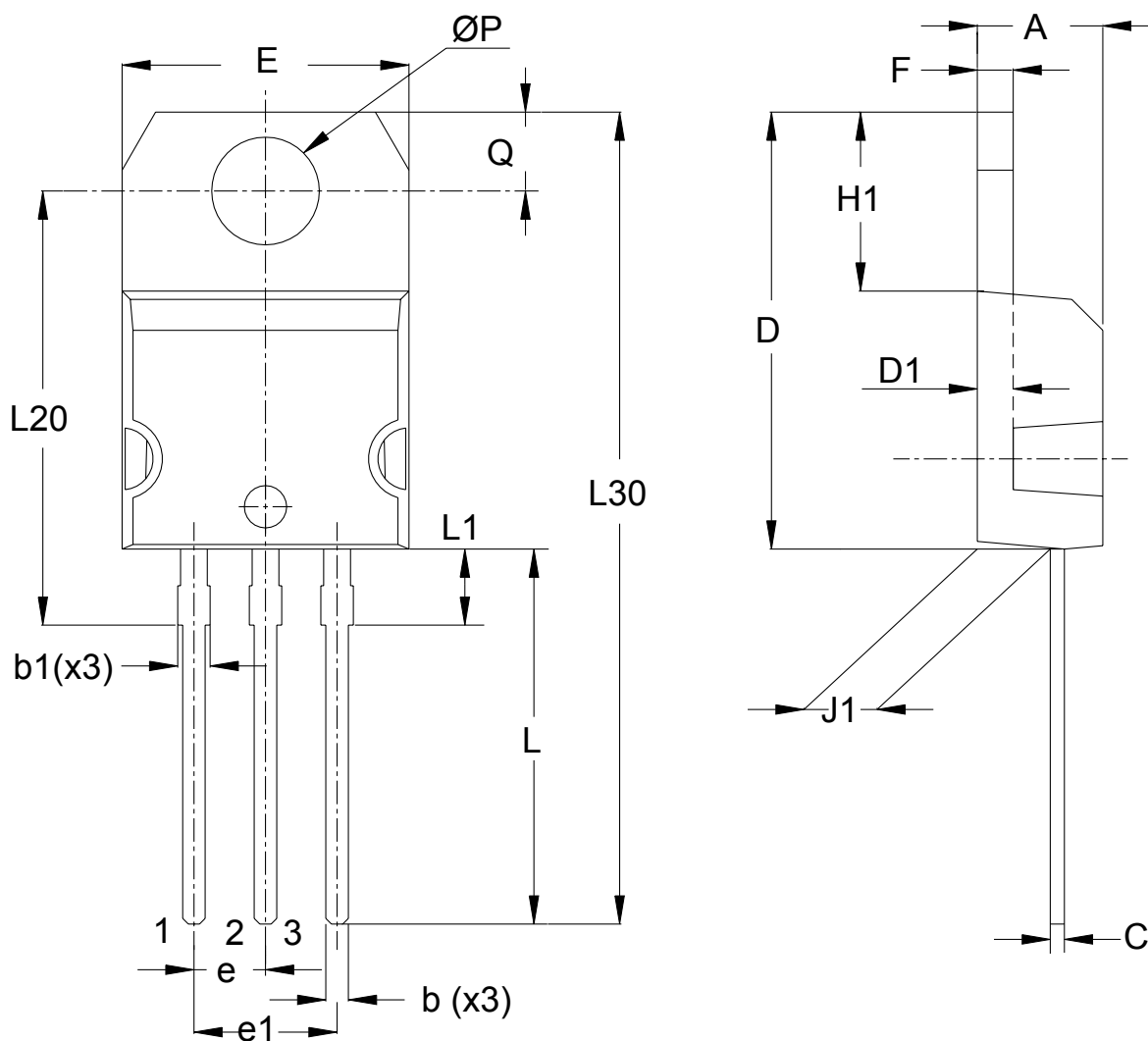
**Table 4. TO-220AB package mechanical data**

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 <sup>2</sup> 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 I<sup>2</sup>PAK package.</p> <p>Updated <a href="#">Table 1. Absolute ratings</a> (limiting values at 25 °C, per diode, unless otherwise specified).</p> <p>Removed figure 1, figure 5 and figure 10.</p> <p>Updated <a href="#">Section 1.1 Characteristics (curves)</a> and <a href="#">Table 4. TO-220AB package mechanical data</a>.</p> <p>Minor text changes to improve readability.</p>

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