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# STPS40120C

## Power Schottky rectifier

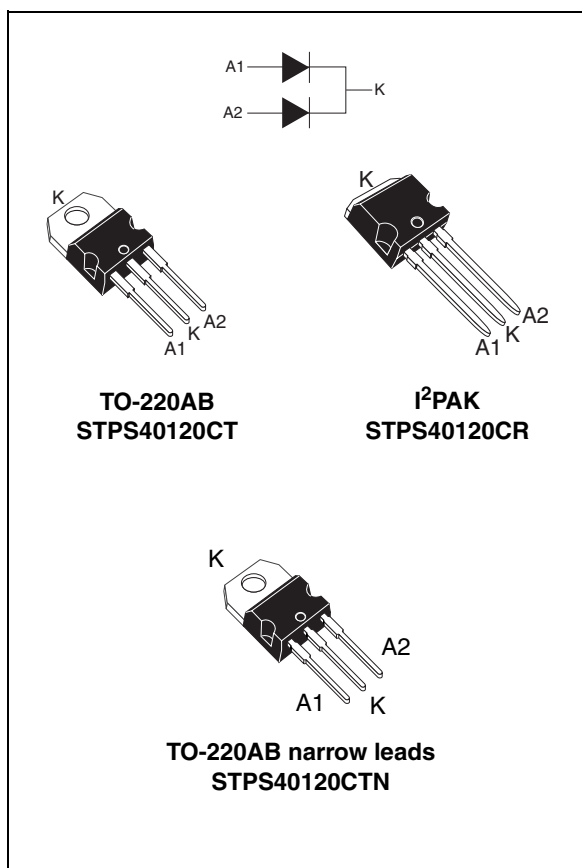
### Features

- 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<sup>2</sup>PAK, 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 20 A
$V_{RRM}$	120 V
$T_{j(max)}$	175 °C
$V_{F(typ)}$	0.57 V

Characteristics

STPS40120C

# 1 Characteristics

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

Symbol	Parameter			Value	Unit
V <sub>RRM</sub>	Repetitive peak reverse voltage			120	V
I <sub>F(RMS)</sub>	Forward rms current			30	A
I <sub>F(AV)</sub>	Average forward current	δ = 0.5 T <sub>c</sub> = 145 °C	Per diode Per device	20 40	A
I <sub>FSM</sub>	Surge non repetitive forward current		t <sub>p</sub> = 10 ms sinusoidal	200	A
P <sub>ARM</sub>	Repetitive peak avalanche power		t <sub>p</sub> = 1 μs, T <sub>j</sub> = 25 °C	10500	W
T <sub>stg</sub>	Storage temperature range			-65 to + 175	°C
T <sub>j</sub>	Maximum operating junction temperature <sup>(1)</sup>			175	°C

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

**Table 3. Thermal parameters**

Symbol	Parameter		Value	Unit
R <sub>th(j-c)</sub>	Junction to case	Per diode Total	1.6 0.85	°C/W
R <sub>th(c)</sub>	Coupling	Total	0.1	°C/W

When the diodes 1 and 2 are used simultaneously:

$$\Delta T_j(\text{diode 1}) = P(\text{diode 1}) \times R_{th(j-c)}(\text{per diode}) + P(\text{diode 2}) \times R_{th(c)}$$

**Table 4. Static electrical characteristics (per diode)**

Symbol	Test conditions			Min.	Typ.	Max.	Unit
I <sub>R</sub> <sup>(1)</sup>	Reverse leakage current	T <sub>j</sub> = 25 °C	V <sub>R</sub> = V <sub>RRM</sub>			25	μA
		T <sub>j</sub> = 125 °C			4	12	mA
V <sub>F</sub> <sup>(2)</sup>	Forward voltage drop	T <sub>j</sub> = 25 °C	I <sub>F</sub> = 7.5 A			0.73	V
		T <sub>j</sub> = 125 °C			0.57	0.61	
		T <sub>j</sub> = 25 °C	I <sub>F</sub> = 20 A			0.9	
		T <sub>j</sub> = 125 °C			0.69	0.73	
		T <sub>j</sub> = 25 °C	I <sub>F</sub> = 40 A			1	
		T <sub>j</sub> = 125 °C			0.83	0.88	

1. Pulse test: t<sub>p</sub> = 5 ms, δ < 2%

2. Pulse test: t<sub>p</sub> = 380 μs, δ < 2%

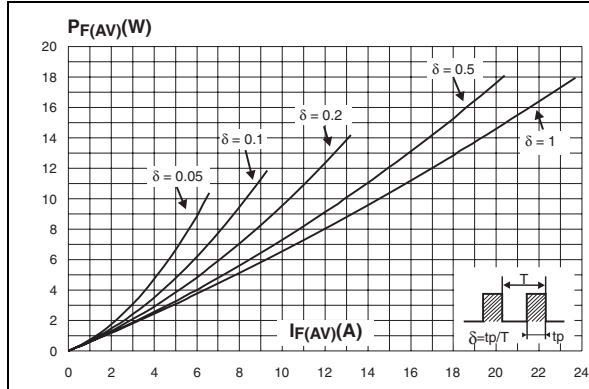
To evaluate the maximum conduction losses use the following equation:

$$P = 0.58 \times I_{F(AV)} + 0.0075 I_{F(RMS)}^2$$

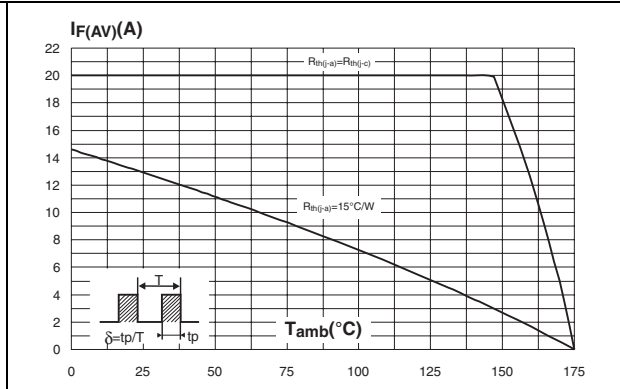
**STPS40120C**

**Characteristics**

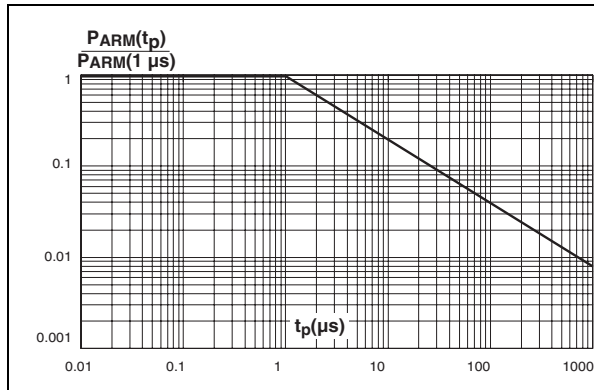
**Figure 1. Average forward power dissipation versus average forward current (per diode)**



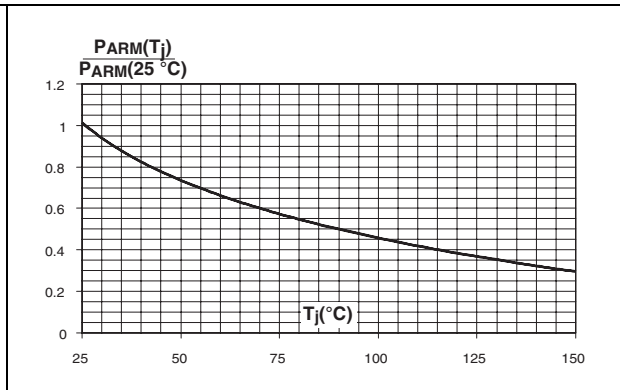
**Figure 2. Average forward current versus ambient temperature (delta = 0.5, per diode)**



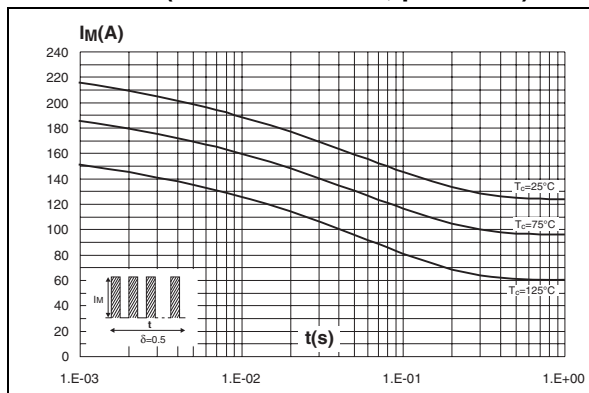
**Figure 3. Normalized avalanche power derating versus pulse duration**



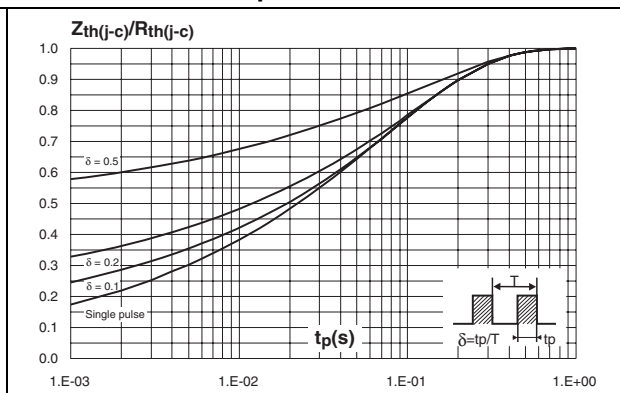
**Figure 4. Normalized avalanche power derating versus junction temperature**



**Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)**



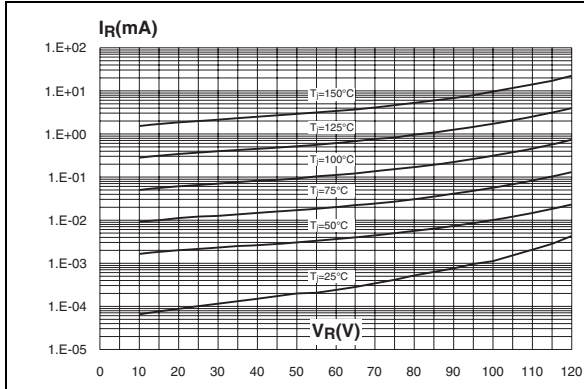
**Figure 6. Relative variation of thermal impedance junction to ambient versus pulse duration**



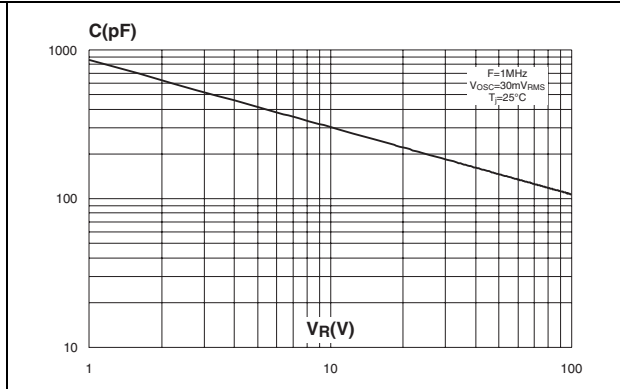
**Characteristics**

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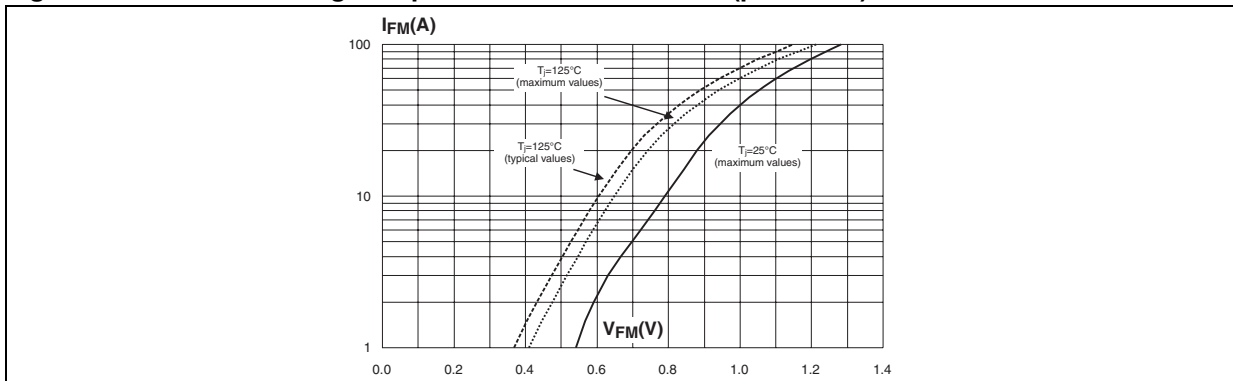
**Figure 7. Reverse leakage current versus reverse voltage applied (typical values, per diode)**



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



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



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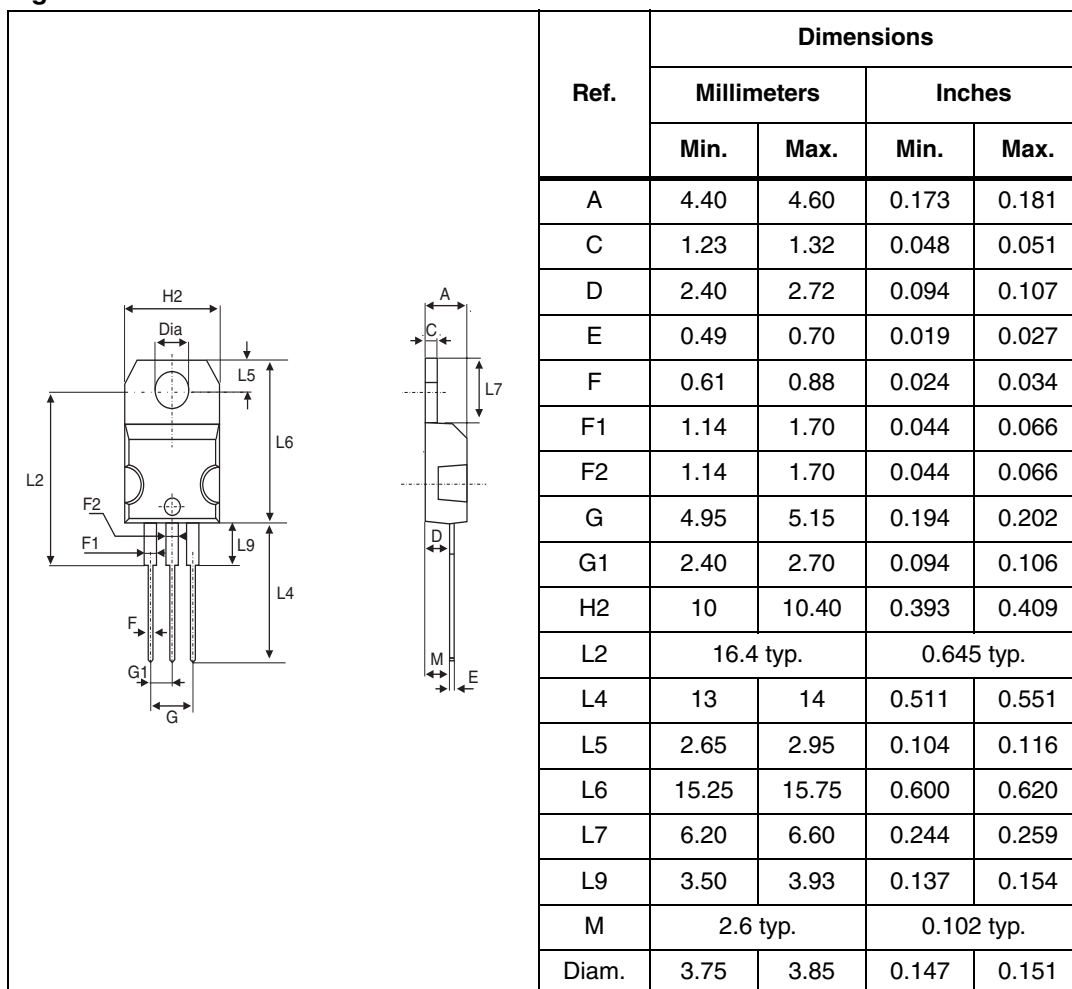
Package information

## 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](http://www.st.com). ECOPACK® is an ST trademark.

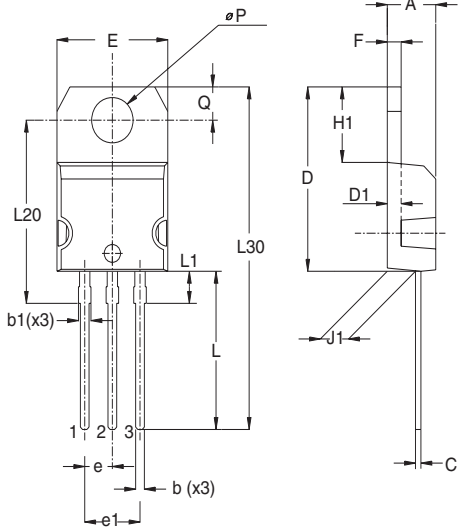
Figure 10. TO-220AB dimensions



Package information

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Table 5. 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

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**Package information**

Devices in I<sup>2</sup>PAK 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 6. I<sup>2</sup>PAK 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 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS40120CT	STPS40120CT	TO-220AB	2.2 g	50	Tube
STPS40120CR	STPS40120CR	I <sup>2</sup> PAK	1.49 g	50	Tube
STPS40120CTN	PS40120CTN	TO-220AB narrow leads	1.9 g	50	Tube

### 4 Revision history

Table 8. Document revision history

Date	Revision	Changes
18-Feb-2005	1	First issue
1-Dec-2006	2	Reformatted to current standards. Added I <sup>2</sup> PAK.
15-Sep-2011	3	Added TO-220AB narrow leads package.

## STPS40120C

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