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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 I²PAK, 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.

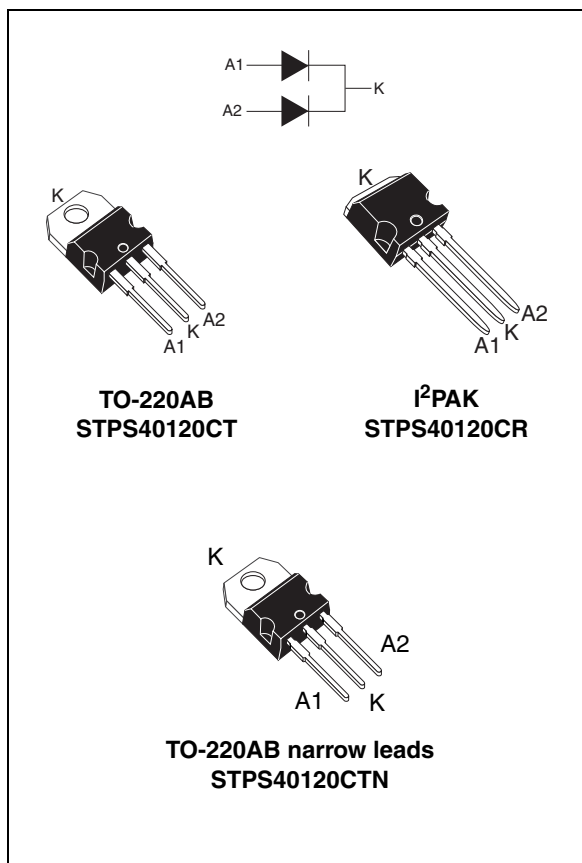


Table 1. Device summary

$I_{F(AV)}$	2 x 20 A
V_{RRM}	120 V
$T_{j(max)}$	175 °C
$V_{F(typ)}$	0.57 V

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	δ = 0.5	Per diode	20	A
		T _c = 145 °C	Per device	40	
I _{FSM}	Surge non repetitive forward current		t _p = 10 ms sinusoidal	200	A
P _{ARM}	Repetitive peak avalanche power		t _p = 1 μs, T _j = 25 °C	10500	W
T _{stg}	Storage temperature range		-65 to + 175	°C	
T _j	Maximum operating junction temperature ⁽¹⁾		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 _{th(j-c)}	Junction to case	Per diode	1.6	°C/W
		Total	0.85	
R _{th(c)}	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 _R ⁽¹⁾	Reverse leakage current	T _j = 25 °C	V _R = V _{RRM}			25	μA
		T _j = 125 °C			4	12	mA
V _F ⁽²⁾	Forward voltage drop	T _j = 25 °C	I _F = 7.5 A			0.73	V
		T _j = 125 °C			0.57	0.61	
		T _j = 25 °C	I _F = 20 A			0.9	
		T _j = 125 °C			0.69	0.73	
		T _j = 25 °C	I _F = 40 A			1	
		T _j = 125 °C			0.83	0.88	

1. Pulse test: t_p = 5 ms, δ < 2%

2. Pulse test: t_p = 380 μs, δ < 2%

To evaluate the maximum conduction losses use the following equation:

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

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

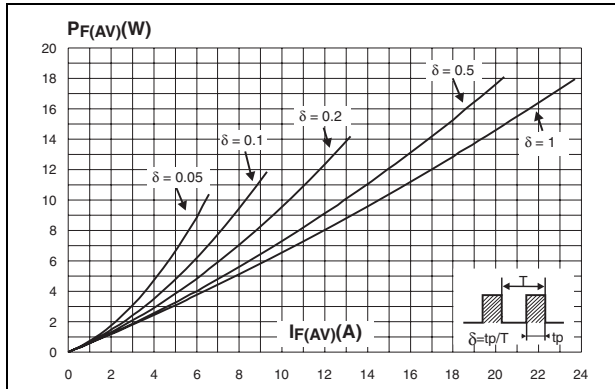


Figure 2. Average forward current versus ambient temperature ($\delta = 0.5$, per diode)

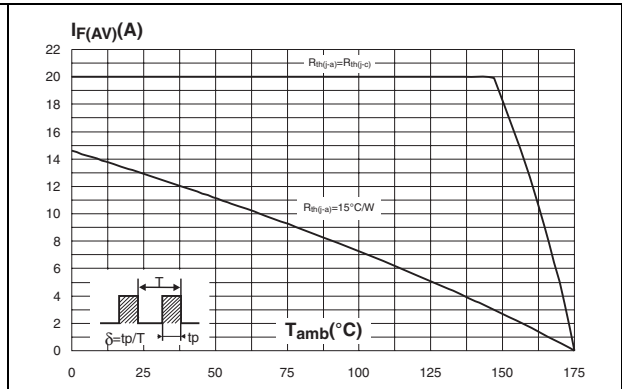


Figure 3. Normalized avalanche power derating versus pulse duration

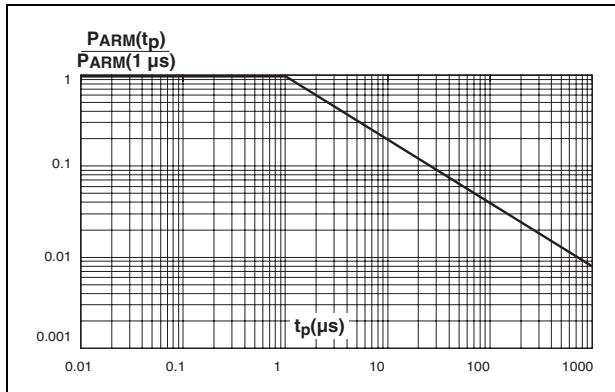


Figure 4. Normalized avalanche power derating versus junction temperature

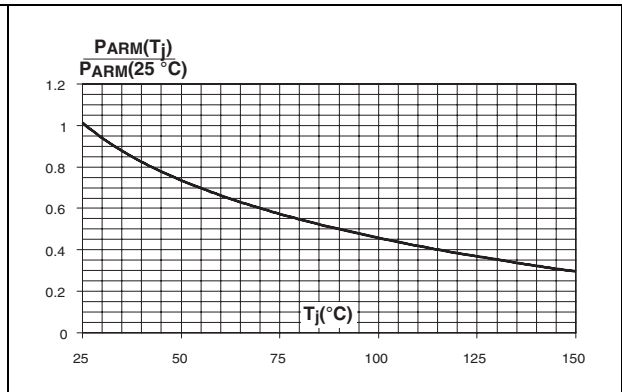


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)

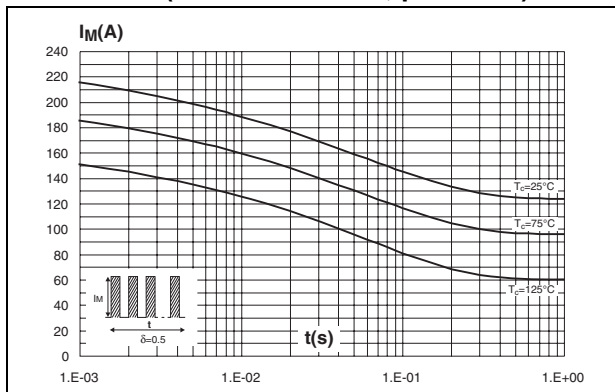


Figure 6. Relative variation of thermal impedance junction to ambient versus pulse duration

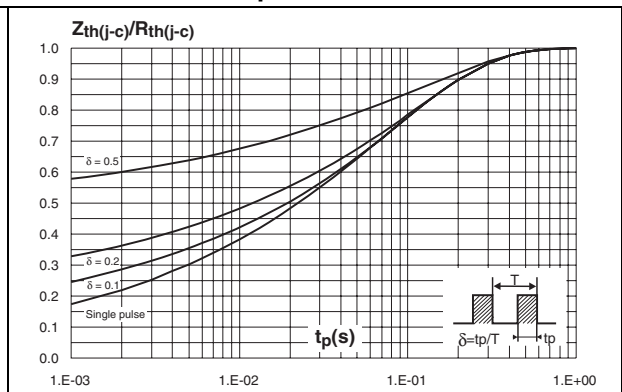


Figure 7. Reverse leakage current versus reverse voltage applied (typical values, per diode)

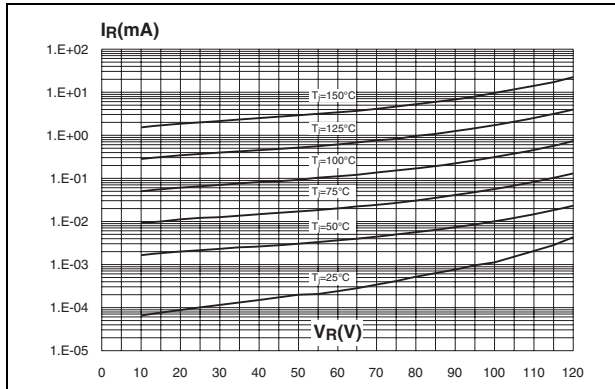


Figure 8. Junction capacitance versus reverse voltage applied (typical values, per diode)

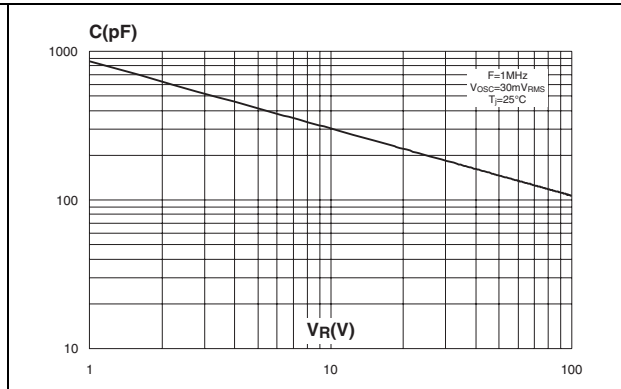
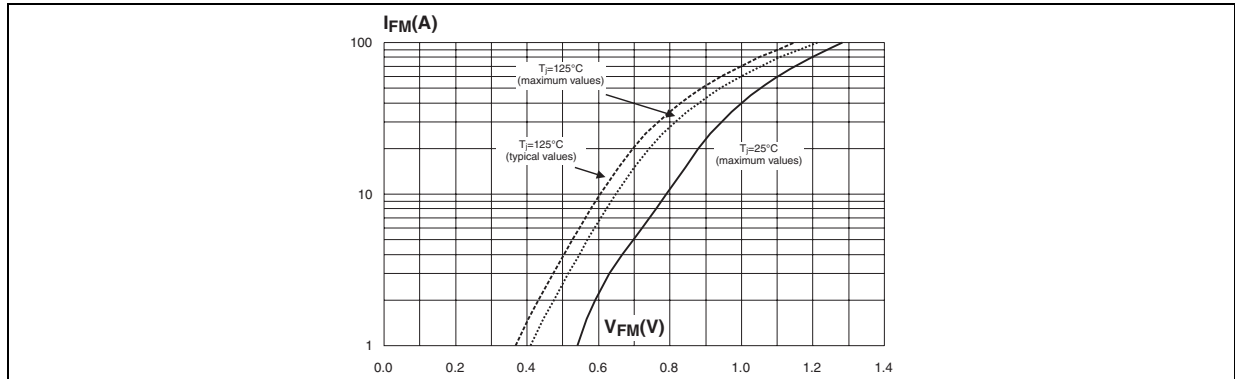


Figure 9. Forward voltage drop versus forward current (per diode)



2 Package information

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

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Figure 10. TO-220AB dimensions

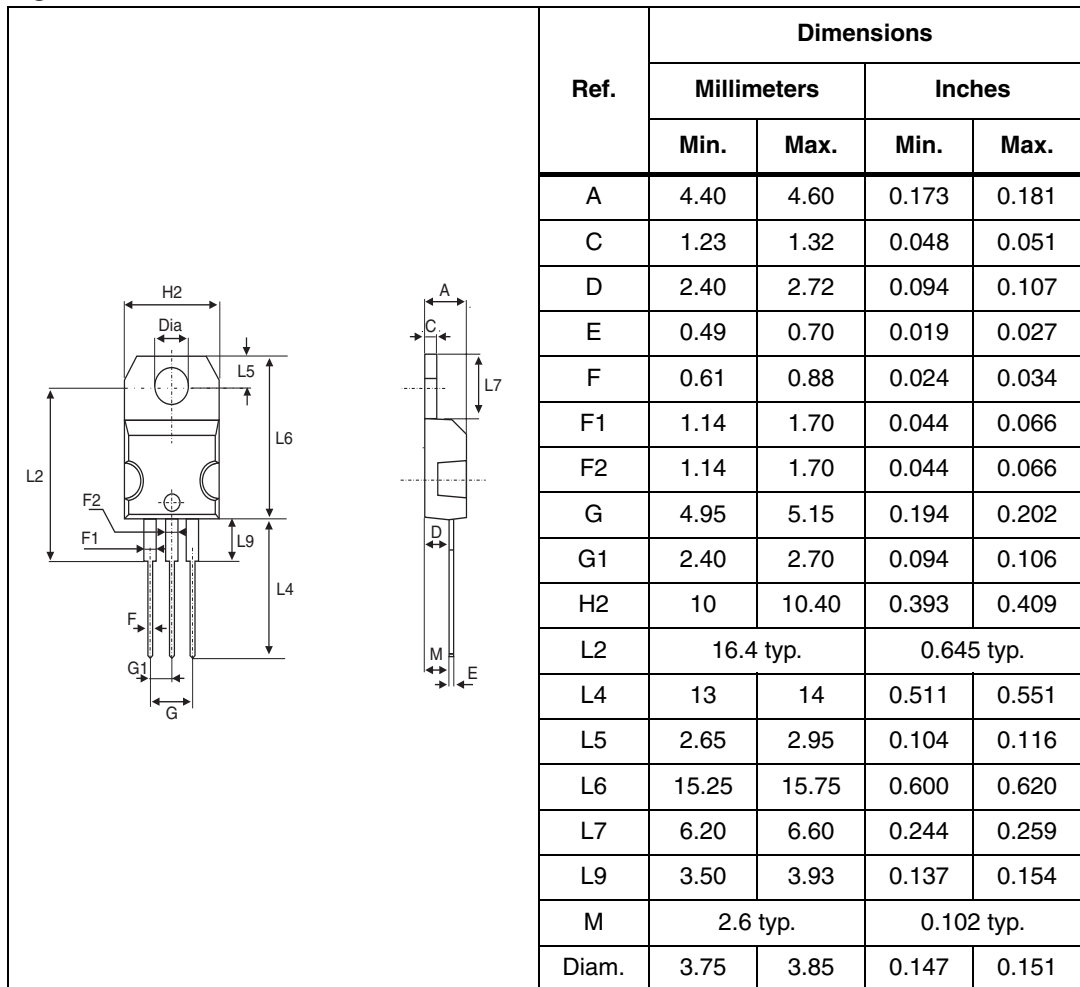
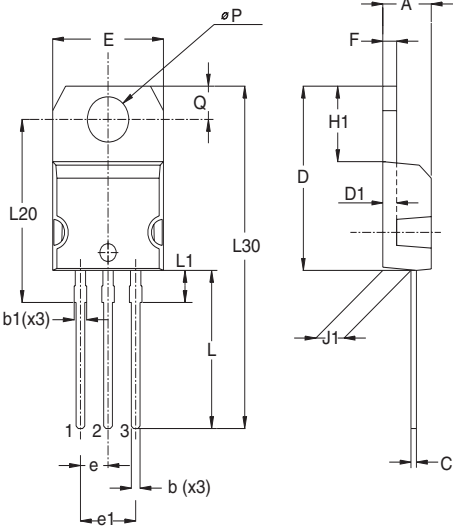


Table 5. TO-220AB narrow leads dimensions



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

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 6. 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

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 ² 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 ² PAK.
15-Sep-2011	3	Added TO-220AB narrow leads package.

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