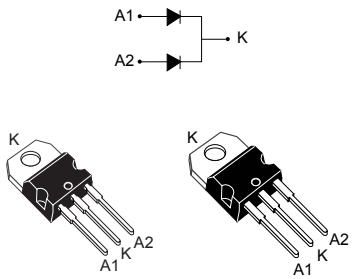
STPS40120C

Datasheet

120 V power Schottky rectifier



TO-220AB narrow leads **TO-220AB**

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
- Notebook adapter

Description

This dual center tap Schottky rectifier is ideally suited for high frequency switch mode power supply.

Packaged in TO-220AB and TO-220AB narrow leads, the STPS40120C is optimized for use in notebook and LCD adapters, 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	
STPS40120C	
Product summary	
Symbol	**Device**
$I_{F(AV)}$	2 x 20 A
V_{RRM}	120 V
T_j (max.)	175 °C
V_F (typ.)	0.69 V

1 Characteristics

Table 1. Absolute ratings (limiting values at 25 °C unless otherwise specified, 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 , T_c = 145 °C, δ = 0.5	Per diode	20	A
		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 = 10 µs, T_j = 125 °C	755	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	1.6	°C/W
		Total	0.85	
$R_{th(c)}$	Coupling		0.1	

When the diodes 1 and 2 are used simultaneously:

ΔT_j(diode 1) = P(diode 1) x $R_{th(j-c)}$(per diode) + P(diode 2) x $R_{th(c)}$

Table 3. Static electrical characteristics

Symbol	Parameter	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	-		0.90	
		T_j = 125 °C		-	0.69	0.73	
		T_j = 25 °C	I_F = 40 A	-		1.00	
		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 conduction losses, use the following equation:

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

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)

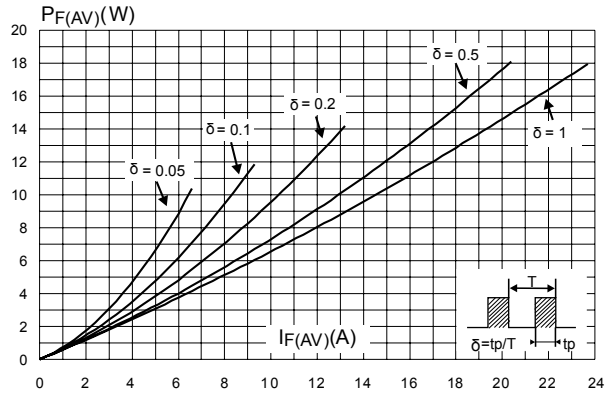


Figure 2. Average forward current versus ambient temperature (δ = 0.5, per diode)

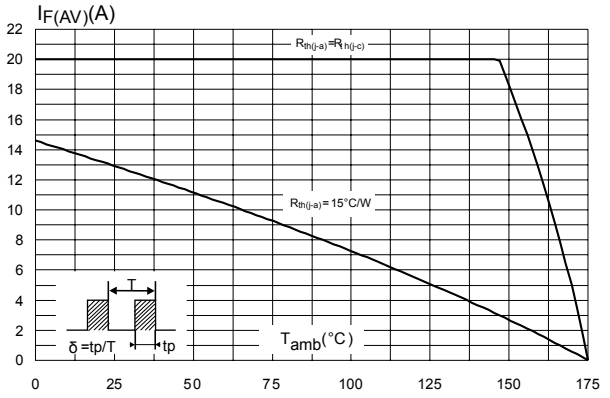


Figure 3. Normalized avalanche power derating versus pulse duration (T_j = 125 °C)

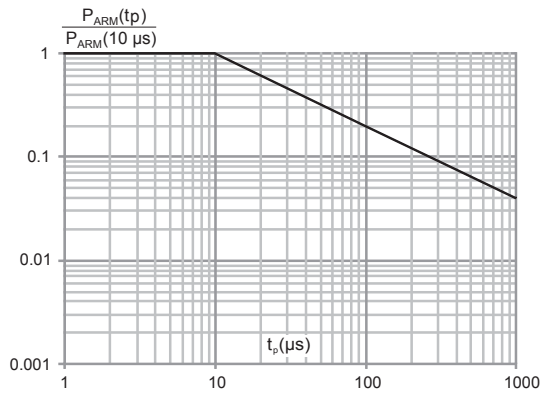


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

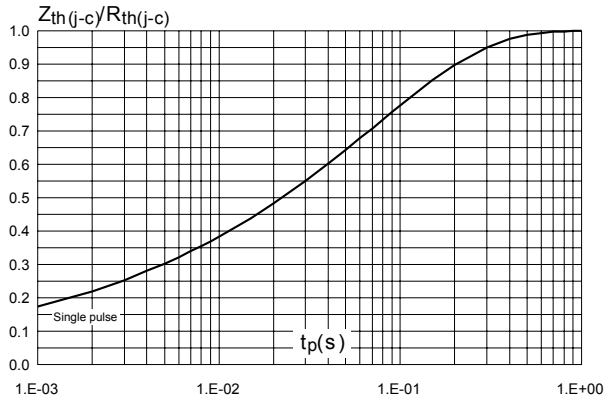


Figure 5. Reverse leakage current versus reverse voltage applied (typical values, per diode)

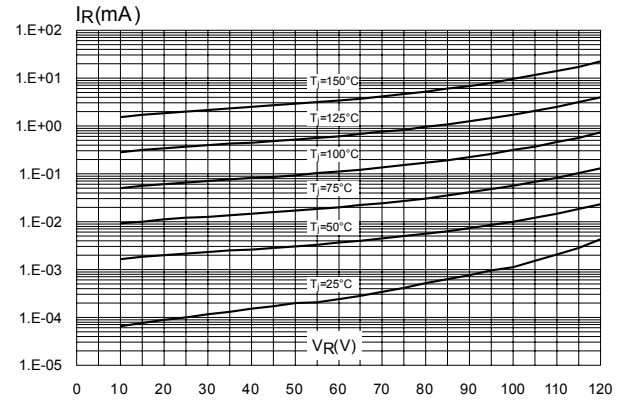


Figure 6. Junction capacitance versus reverse voltage applied (typical values, per diode)

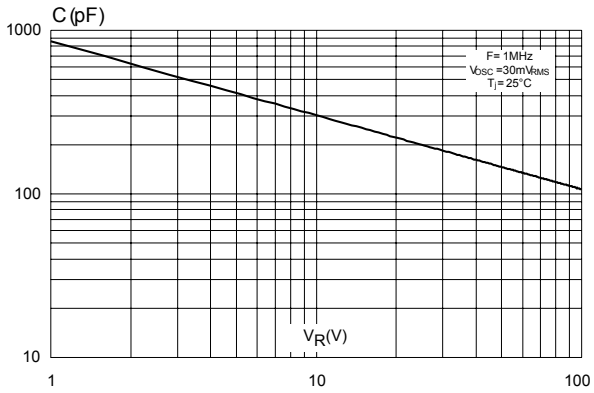
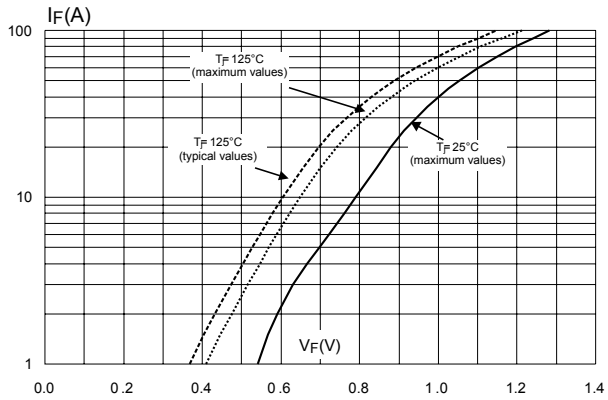


Figure 7. Forward voltage drop versus forward current (per diode)



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

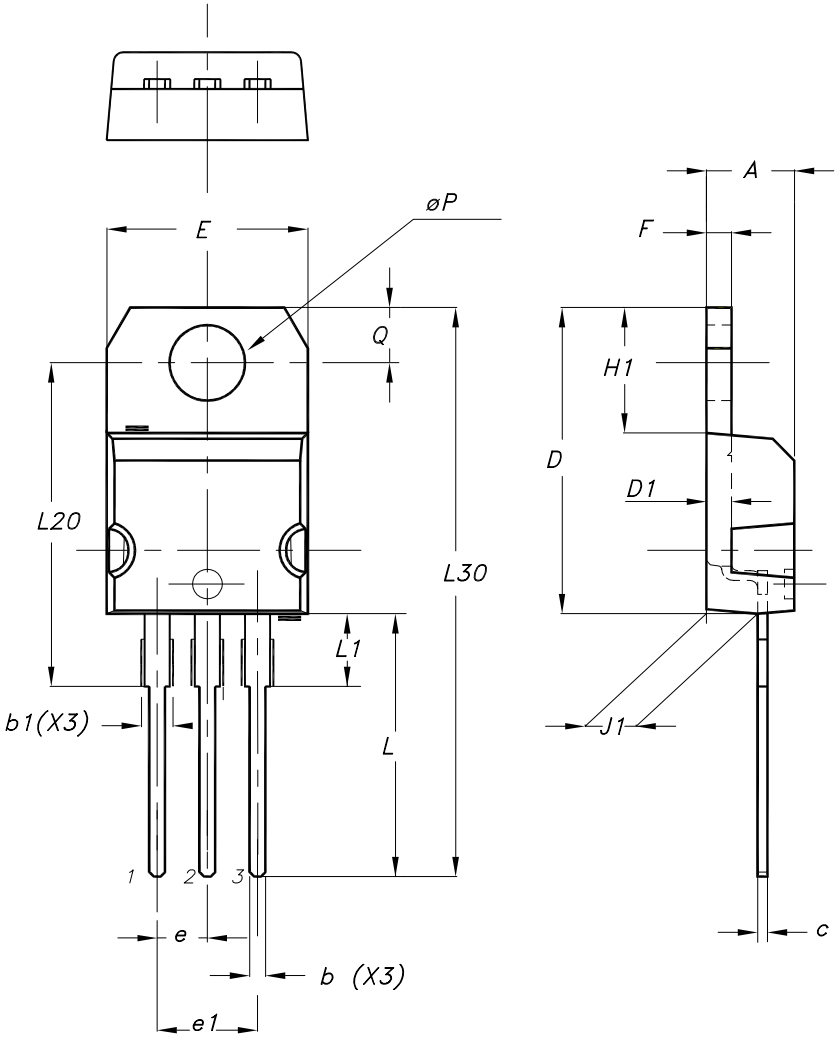


Table 4. TO-220AB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	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

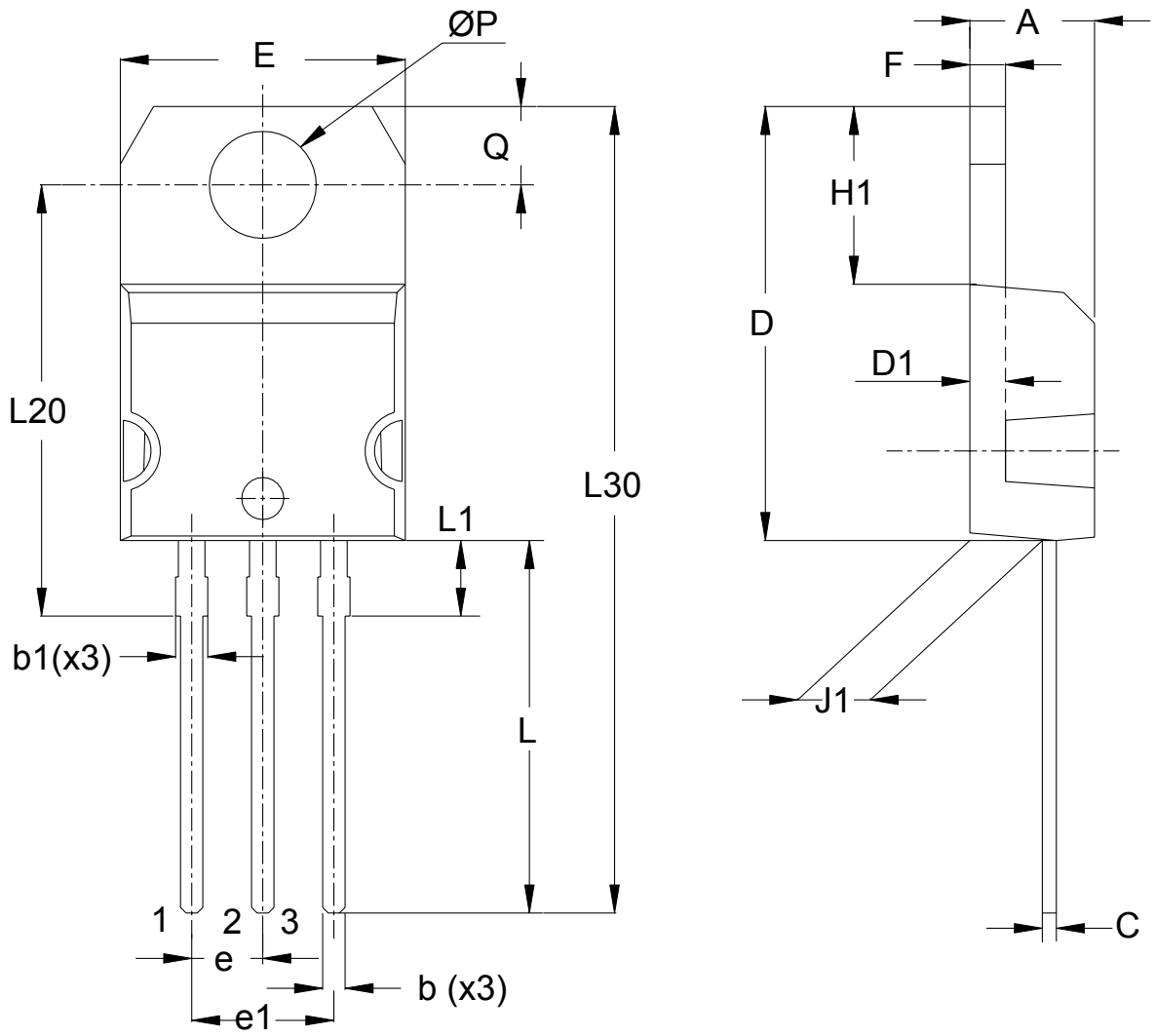


Table 5. TO-220AB narrow leads package mechanical data

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	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
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
STPS40120CT	STPS40120CT	TO-220AB	1.95 g	50	Tube
STPS40120CTN	PS40120CTN	TO-220AB narrow leads	1.9 g	50	Tube

Revision history

Table 7. Document revision history

Date	Version	Changes
18-Feb-2005	1	First issue
1-Dec-2006	2	Reformatted to current standards. Added I^2PAK.
15-Sep-2011	3	Added TO-220AB narrow leads package.
21-Jun-2018	4	Removed I²PAK package, figure 4 and figure 5. Updated Figure 3. Normalized avalanche power derating versus pulse duration (T_j = 125 °C) and Table 1. Absolute ratings (limiting values at 25 °C unless otherwise specified, per diode). Minor text changes to improve readability.

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