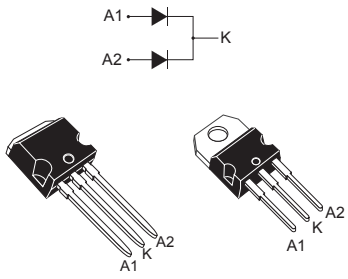
STPS40SM120C

Datasheet

120 V power Schottky rectifier



I²PAK TO-220AB

Features

- High current capability
- Avalanche rated
- Low forward voltage drop current
- High frequency operation
- ECOPACK®2 compliant

Applications

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

Description

This Schottky rectifier is suited for high frequency switch mode power supply.

The voltage drop versus leakage current trade-off is in keeping with medium power hi-density adapter design.

Packed in TO-220AB and I²PAK, the STPS40SM120C is optimized for use in notebook, game station and desktop adaptors, providing in these applications a good efficiency at both low and high load.

Product status link	
STPS40SM120C	
Product summary	
Symbol	**Value**
$I_{F(AV)}$	2 x 20 A
V_{RRM}	120 V
T_j (max.)	150 °C
V_F (typ.)	0.63 V

1 Characteristics

Table 1. Absolute Ratings (limiting values, per diode, at 25 °C, 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, δ = 0.5	T_C = 125 °C	Per diode	20	A
		T_C = 115 °C	Per device	40	
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		210	A
P_{ARM}	Repetitive peak avalanche power	t_p = 10 µs , T_j = 125 °C		1150	W
T_{stg}	Storage temperature range			-65 to +175	°C
T_j	Maximum operating junction temperature(1)			150	°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		Value	Unit
$R_{th(j-c)}$	Junction to case	Per diode	1.35	°C/W
		Total	0.93	
$R_{th(c)}$	Coupling		0.50	

When the diodes 1 and 2 are used simultaneously:

$\Delta T_{j\ (diode1)} = P_{(diode1)} \times R_{th(j-c)}$ (per diode) + $P_{(diode2)} \times R_{th(c)}$

For more information, please refer to the following application note :

- AN5088 : Rectifiers thermal management, handling and mounting recommendations

Table 3. Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-	55	275	µA
		T_j = 125 °C		-	20	50	mA
V_F (2)	Forward voltage drop	T_j = 125 °C	I_F = 5 A	-	0.46	0.51	V
		T_j = 125 °C	I_F = 10 A	-	0.55	0.60	
		T_j = 25 °C	I_F = 20 A	-		0.83	
		T_j = 125 °C		-	0.63	0.69	

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: $P = 0.52 \times I_{F(AV)} + 0.0085 \times I_F{}^2{}_{(RMS)}$

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)

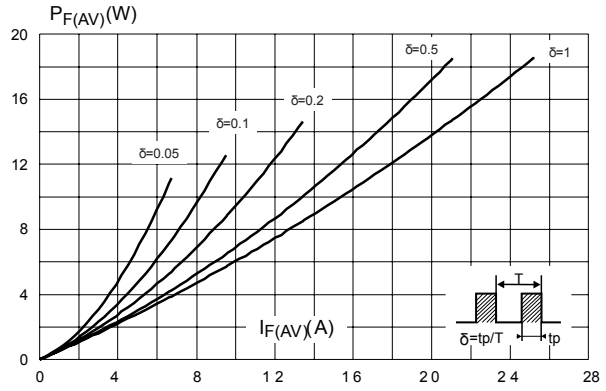


Figure 2. Average forward current versus ambient temperature (δ = 0.5, per diode)

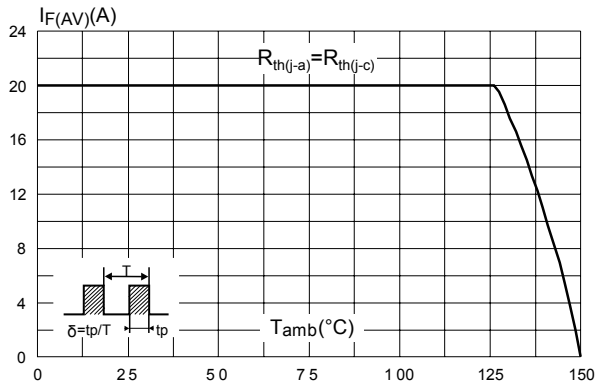


Figure 3. Normalized avalanche power derating versus pulse duration (T_j = 125 °C)

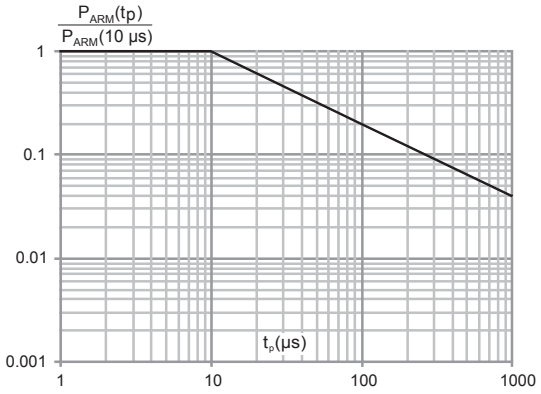


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

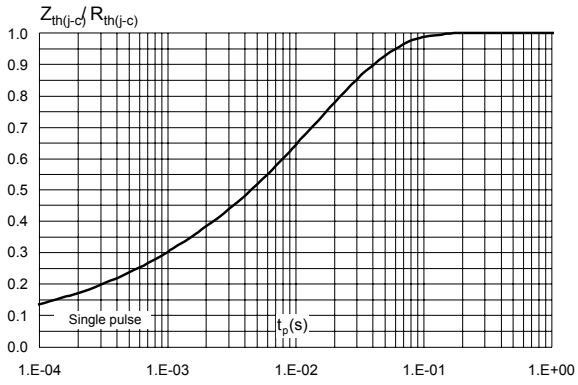


Figure 5. Reverse leakage current versus reverse voltage applied (typical values, per diode)

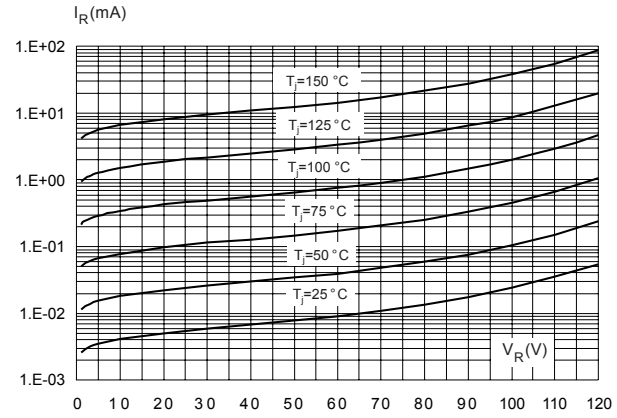


Figure 6. Junction capacitance versus reverse voltage applied (typical values, per diode)

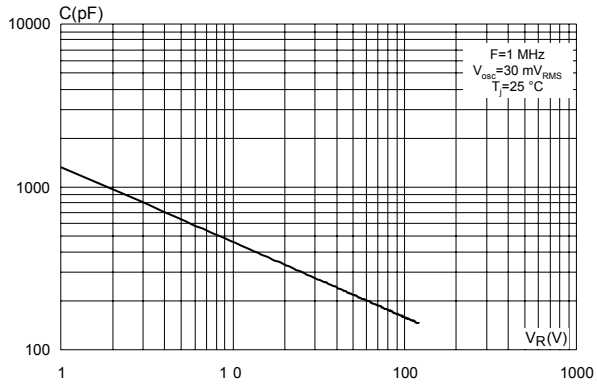
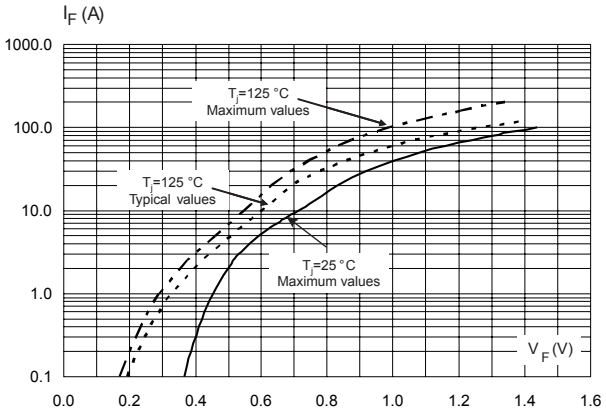


Figure 7. Forward voltage drop versus forward current (per diode)



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

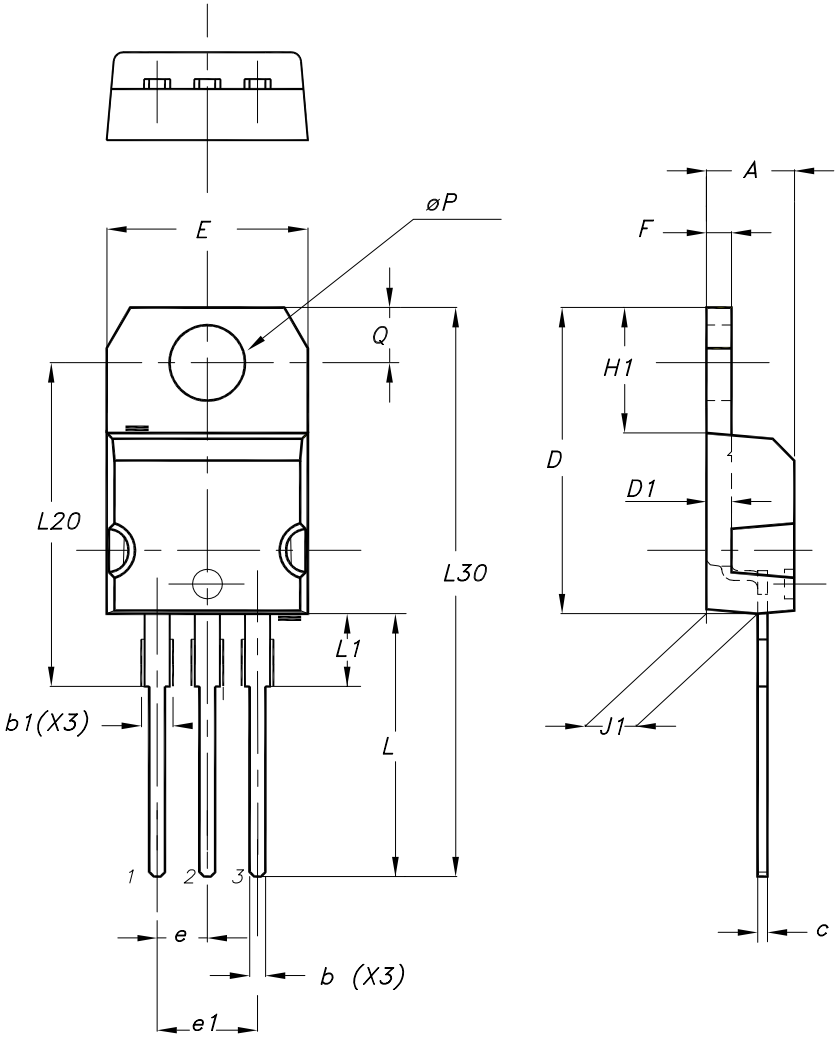


Table 4. TO-220AB package mechanical data

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 I²PAK package information

- Epoxy meets UL 94,V0
- Cooling method: by conduction (C)

Figure 9. I²PAK package outline

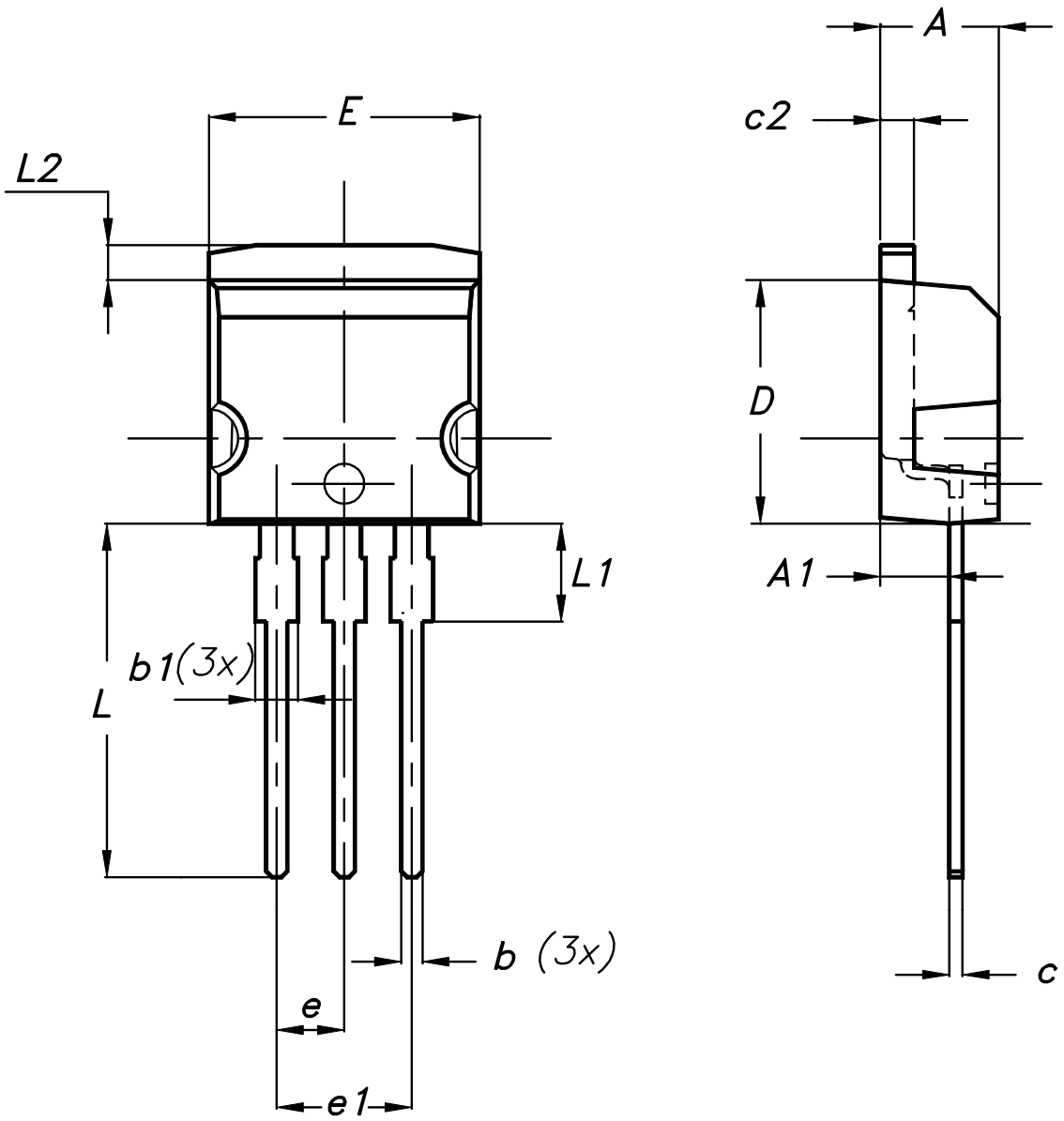


Table 5. I²PAK package mechanical data

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	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	10.00	10.40	0.394	0.409
L	13.00	14.00	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 6. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS40SM100CT	PS40SM100CT	TO-220AB	1.95 g	50	Tube
STPS40SM100CR	PS40SM100CR	I^2PAK	1.50 g	50	Tube

Revision history

Table 7. **Document revision history**

Date	Version	Changes
02-Apr-2012	1	First issue.
04-Nov-2014	2	Added TO-220AB and TO-220FPAB package information.
11-Apr-2017	3	Updated Section 1: "Characteristics" and Section 1.1: "Characteristics (curves)".
27-Jun-2018	4	Updated Table 1. Absolute Ratings (limiting values, per diode, at 25 °C, unless otherwise specified) and Figure 3. Normalized avalanche power derating versus pulse duration (T_j = 125 °C). Removed TO-220AB narrow leads package information.

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