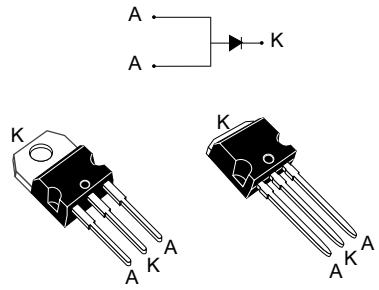
STPS20M120S

Datasheet

120 V power Schottky rectifier



TO-220AB narrow leads I²PAK

Features

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

Applications

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

Description

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

Packaged in TO-220AB narrow leads and I²PAK, the STPS20M120S is optimized for use in notebook, game station and desktop adapters, providing in these applications a good efficiency at both low and high load.

Product status
STPS20M120S

Product summary	
$I_{F(AV)}$	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 at 25 °C, unless otherwise specified, anode terminals short circuited)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		120	V
$I_{F(RMS)}$	Forward rms current		50	A
$I_{F(AV)}$	Average forward current δ = 0.5, square wave	T_C = 125 °C	20	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	240	A
P_{ARM}	Repetitive peak avalanche power	t_p = 10 µs, T_j = 125 °C	1200	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 parameter

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case	1.35	°C/W

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

- AN5088 : Rectifiers thermal management, handling and mounting recommendations

Table 3. Static electrical characteristics (anode terminals short circuited)

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 = 25 °C	I_F = 5 A	-	0.47	0.52	V
		T_j = 25 °C	I_F = 10 A	-		0.72	
		T_j = 125 °C		-	0.52	0.57	
		T_j = 25 °C	I_F = 20 A	-		0.84	
		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:

$P = 0.54 \times I_{F(AV)} + 0.0075\ I_F{}^2{}_{(RMS)}$

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

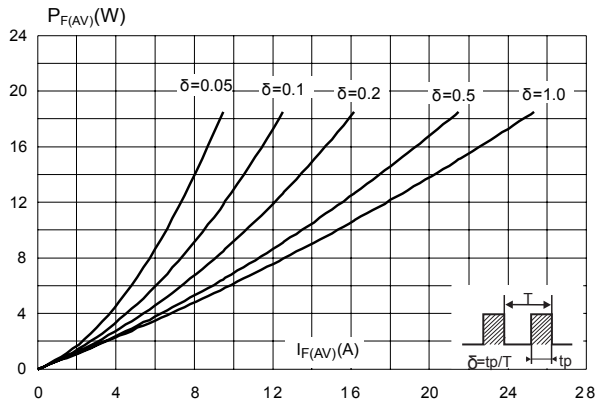


Figure 2. Average forward current versus ambient temperature (δ = 0.5)

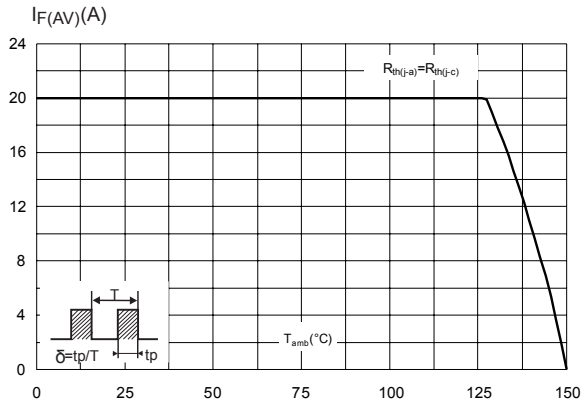


Figure 3. Normalized avalanche power derating versus pulse duration (T_j = 125 °C)

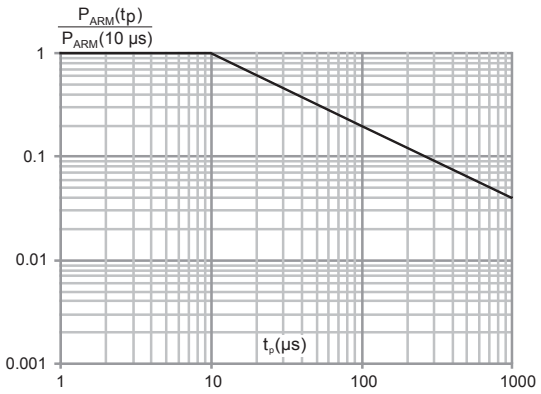


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

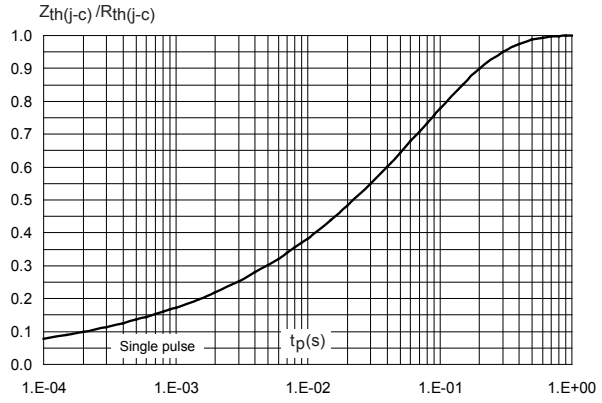


Figure 5. Reverse leakage current versus reverse voltage applied (typical values)

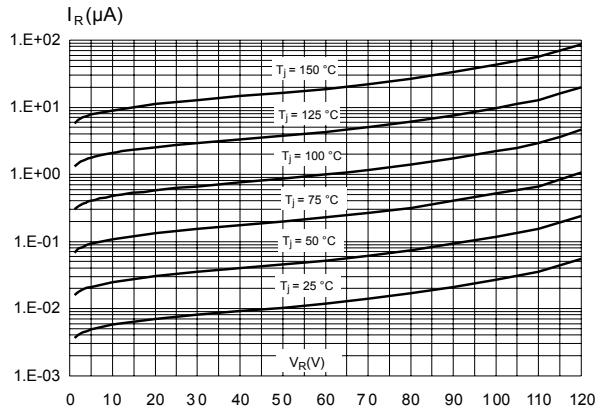


Figure 6. Junction capacitance versus reverse voltage applied (typical values)

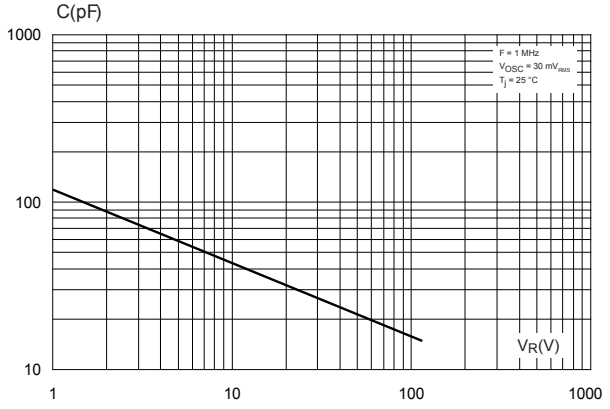
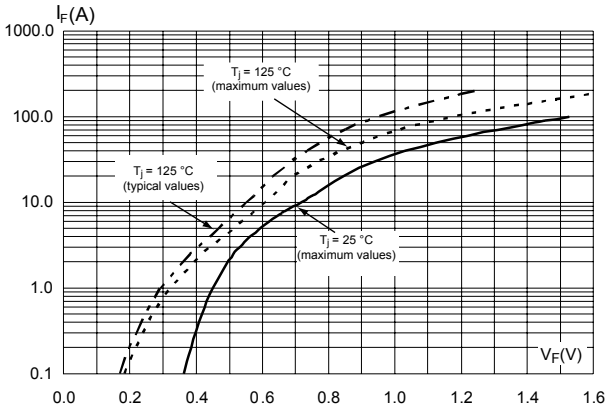


Figure 7. Forward voltage drop versus forward current



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 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 8. TO-220AB narrow leads package outline

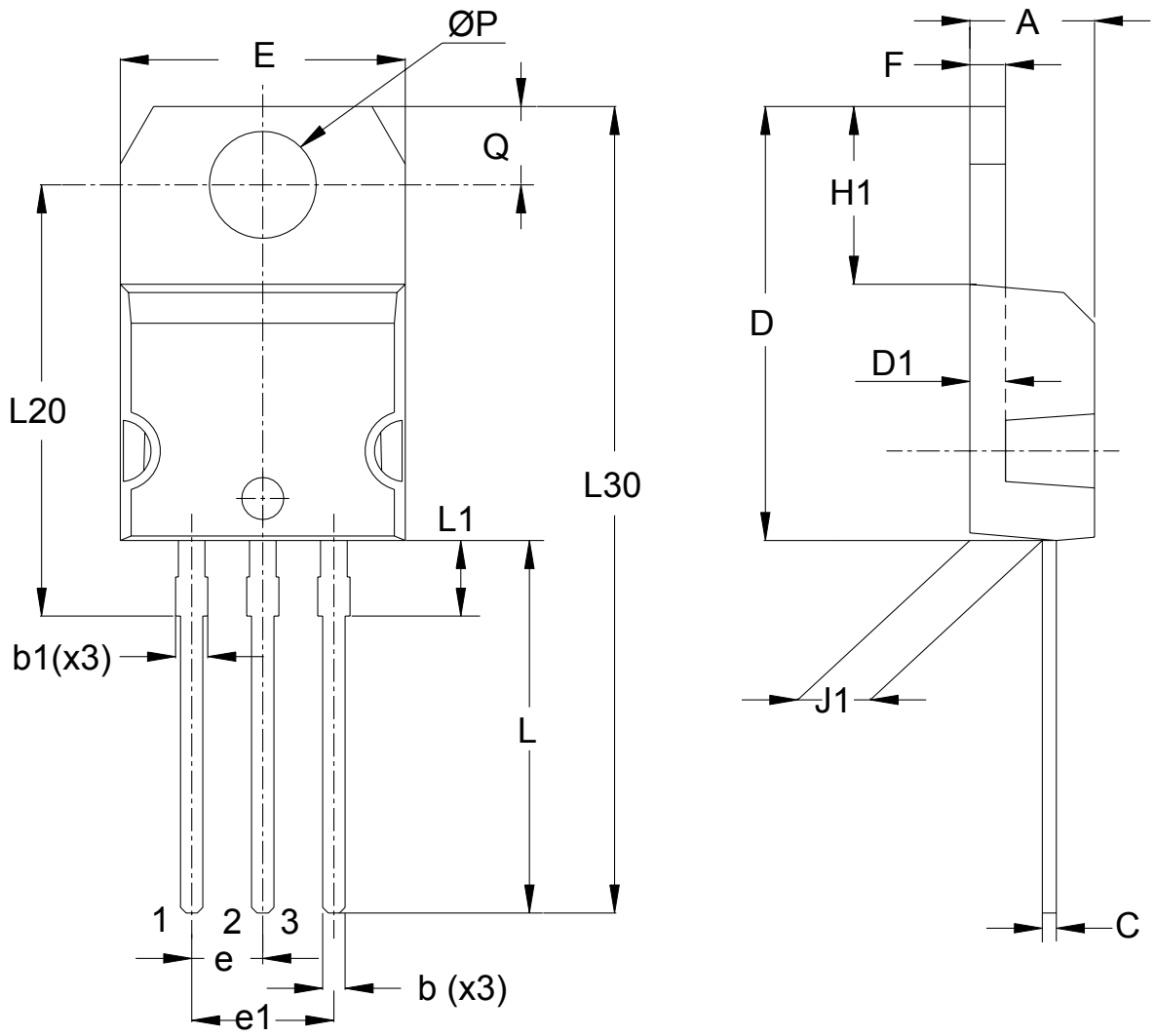


Table 4. **TO-220AB narrow leads package mechanical data**

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

2.2 I²PAK package information

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

Figure 9. I²PAK package outline

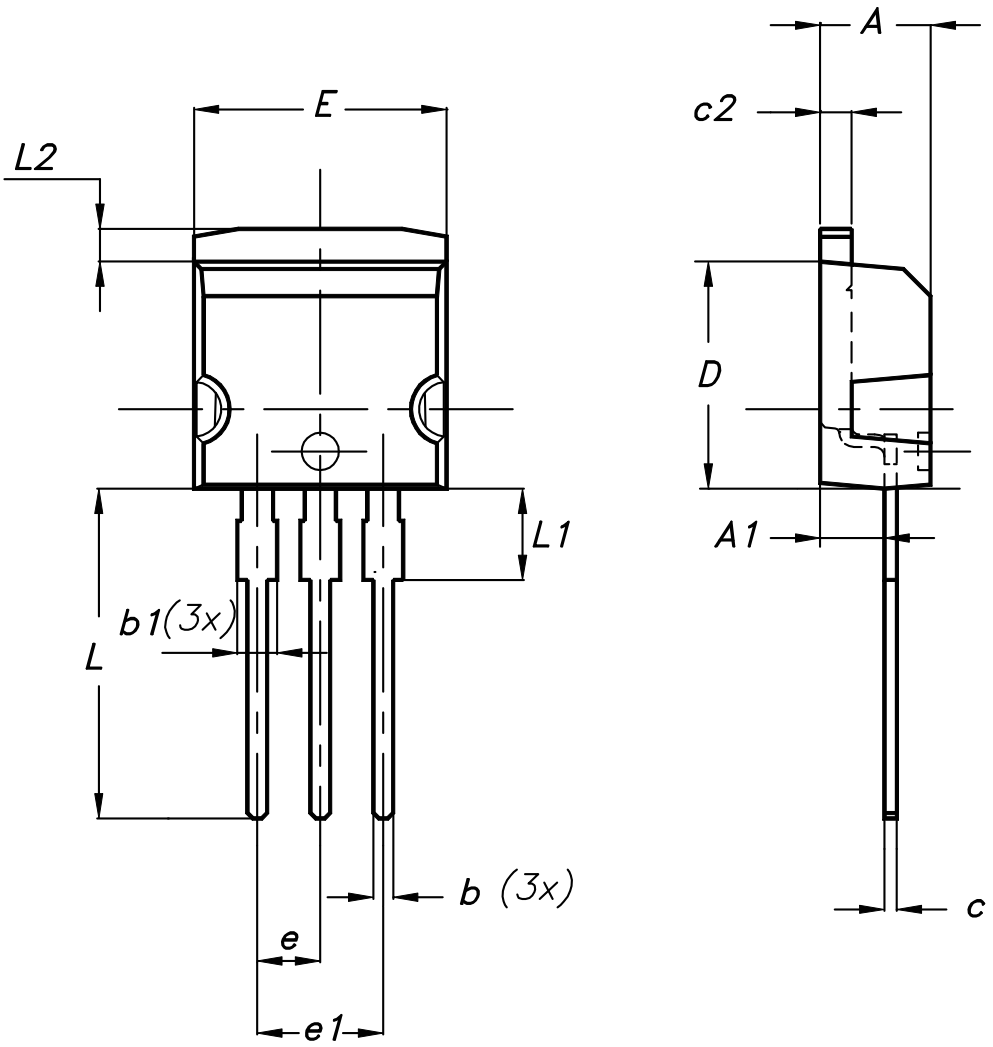


Table 5. I²PAK package mechanical data

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
STPS20M120STN	PS20M120STN	TO-220AB narrow leads	1.90 g	50	Tube
STPS20M120SR	PS20M120SR	I^2PAK	1.50 g	50	Tube

Revision history

Table 7. Document revision history

Date	Revision	Changes
02-Apr-2012	1	First issue.
27-Jun-2018	2	Updated Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified, anode terminals short circuited) and Figure 3. Normalized avalanche power derating versus pulse duration (T_j = 125 °C).
29-Nov-2018	3	Updated Table 6.

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