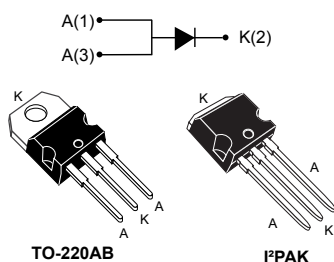


100 V power Schottky rectifier



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
- Desktop power supply

Description

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

Packaged in TO-220AB and I²PAK, the [STPS20SM100S](#) is intended to be used in notebook, game station and desktop adaptors, providing in these applications a good efficiency at both low and high load.

Product status link	
STPS20SM100S	
Product summary	
$I_{F(AV)}$	20 A
V_{RRM}	100 V
$T_j \text{ (max.)}$	150 °C
$V_F \text{ (typ.)}$	0.63 V

1 Characteristics

Table 1. Absolute ratings (limiting values, with terminals 1 and 3 short circuited, at 25 °C, unless otherwise specified)

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	100	V
$I_{F(RMS)}$	Forward rms current	30	A
$I_{F(AV)}$	Average forward current $\delta = 0.5$, square wave	$T_C = 125\text{ °C}$ 20	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10\text{ ms}$ sinusoidal 350	A
P_{ARM}	Repetitive peak avalanche power	$t_p = 10\text{ }\mu\text{s}$, $T_j = 125\text{ °C}$ 1080	W
T_{stg}	Storage temperature range	-65 to +150	°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	Max. value	Unit
$R_{th(j-c)}$	Junction to case	1.3	°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 (with terminals 1 and 3 short circuited)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R ⁽¹⁾	Reverse leakage current	$T_J = 25\text{ }^{\circ}\text{C}$	$V_R = V_{RRM}$	-	10	30	μA
		$T_J = 125\text{ }^{\circ}\text{C}$		-	10	30	mA
		$T_J = 25\text{ }^{\circ}\text{C}$	$V_R = 70\text{ V}$	-	5		μA
		$T_J = 125\text{ }^{\circ}\text{C}$		-	5		mA
V_F ⁽²⁾	Forward voltage drop	$T_J = 25\text{ }^{\circ}\text{C}$	$I_F = 5\text{ A}$	-	565		mV
		$T_J = 125\text{ }^{\circ}\text{C}$		-	480		
		$T_J = 25\text{ }^{\circ}\text{C}$	$I_F = 10\text{ A}$	-	685		
		$T_J = 125\text{ }^{\circ}\text{C}$		-	560	620	
		$T_J = 25\text{ }^{\circ}\text{C}$	$I_F = 20\text{ A}$	-	800	900	
		$T_J = 125\text{ }^{\circ}\text{C}$		-	630	700	

1. Pulse test: $t_p = 5\text{ ms}$, $\delta < 2\%$

2. Pulse test: $t_p = 380\text{ }\mu\text{s}$, $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

$$P = 0.6 \times I_{F(AV)} + 0.005 \times I_F^2 \text{ (RMS)}$$

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 (terminals 1 and 3 short circuited)

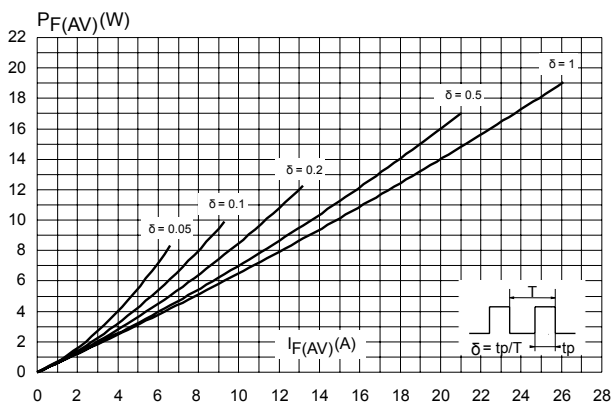


Figure 2. Average forward current versus ambient temperature ($\delta = 0.5$, terminals 1 and 3 short circuited)

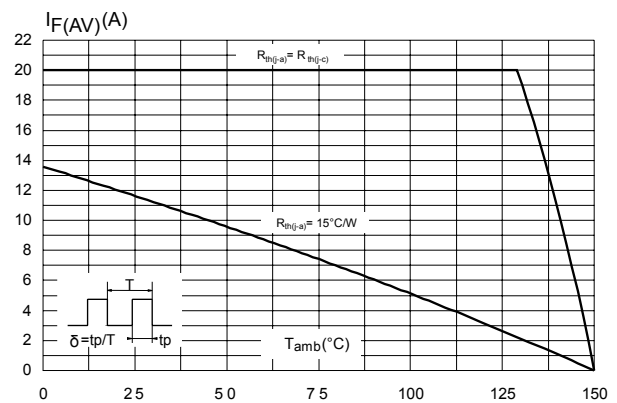


Figure 3. Normalized avalanche power derating versus pulse duration ($T_j = 125^\circ\text{C}$)

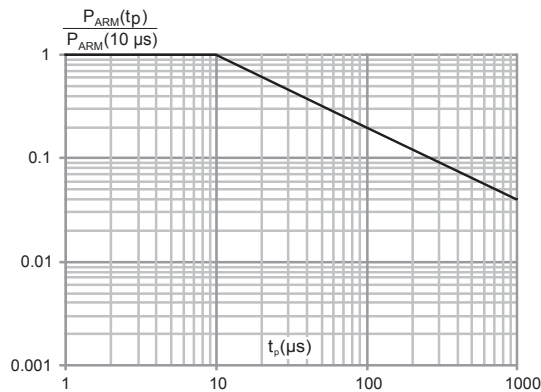


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

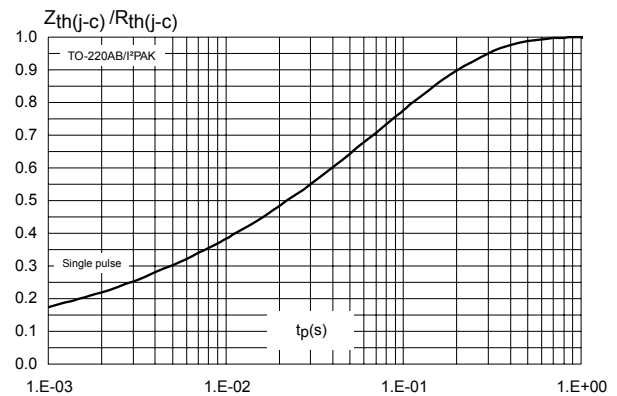


Figure 5. Reverse leakage current versus reverse voltage applied (typical values)

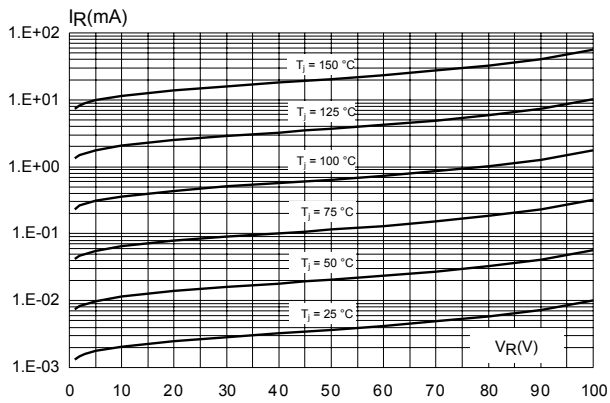


Figure 6. Junction capacitance versus reverse voltage applied (typical values)

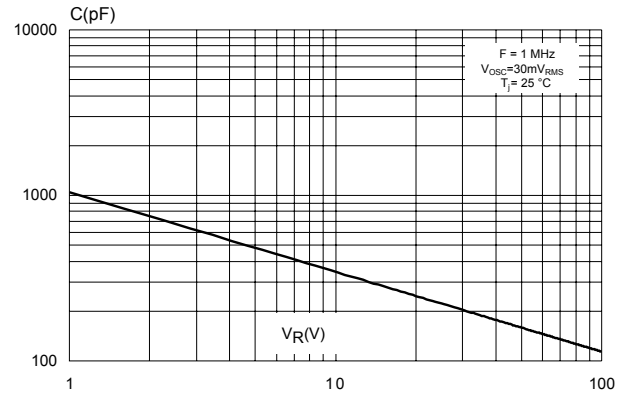
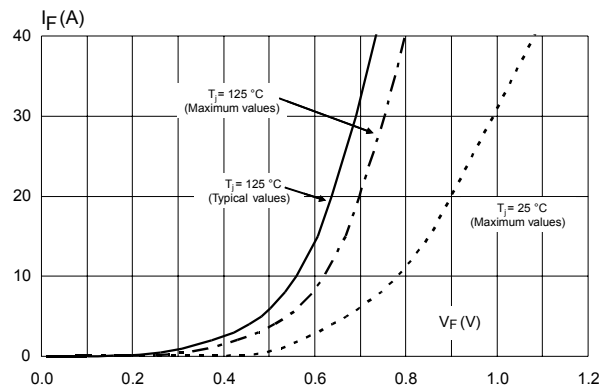


Figure 7. Forward voltage drop versus forward current (terminals 1 and 3 short circuited)



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

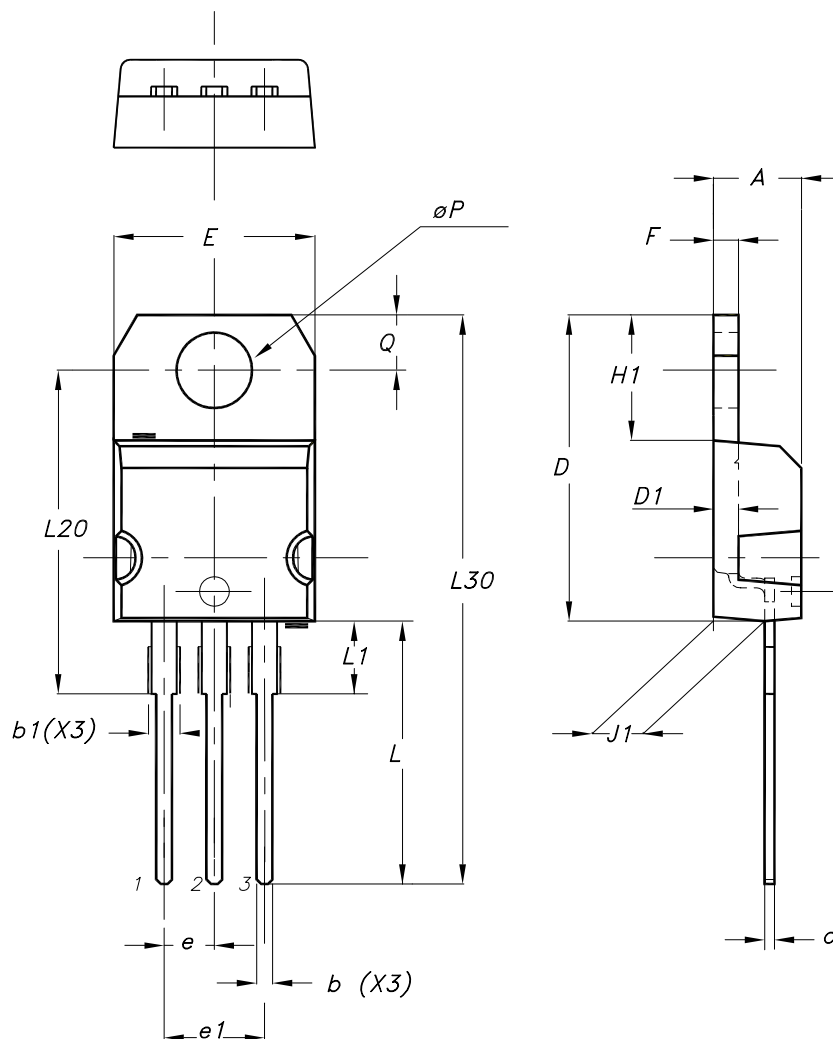


Table 4. TO-220AB package mechanical data

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

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

Figure 9. I²PAK package outline

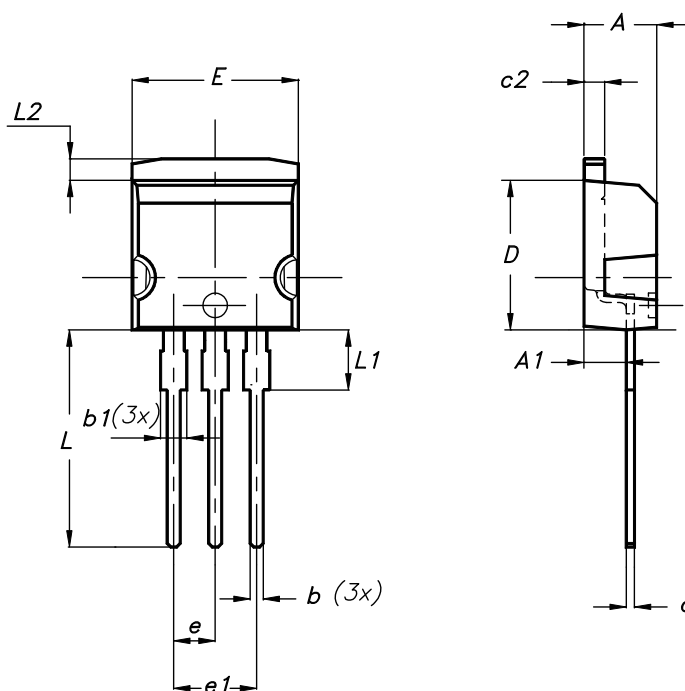


Table 5. I²PAK package mechanical data

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
STPS20SM100ST	PS20SM100ST	TO-220AB	1.95 g	50	Tube
STPS20SM100SR	PS20SM100SR	I ² PAK	1.50 g	50	Tube

Revision history

Table 7. Document revision history

Date	Revision	Changes
25-Mar-2009	1	First issue.
16-Apr-2010	2	Updated package graphic for TO-220AB on front page and in <i>Table 5</i> .
11-May-2017	3	Removed TO-220FPAB and D ² PAK packages.
17-Oct-2018	4	Updated cover page and Table 1. Absolute ratings (limiting values, with terminals 1 and 3 short circuited, at 25 °C, unless otherwise specified) . Removed figure 1 and figure 9. Minor text changes to improve readability.

IMPORTANT NOTICE – PLEASE READ CAREFULLY

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2018 STMicroelectronics – All rights reserved