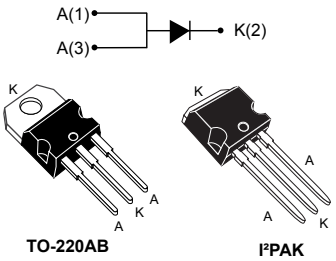
STPS20SM100S

Datasheet

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 (max.)	150 °C
V_F (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 δ = 0.5, square wave	T_C = 125 °C	20	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	350	A
P_{ARM}	Repetitive peak avalanche power	t_p = 10 µs, T_j = 125 °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 °C	$V_R = V_{RRM}$	-	10	30	µA
		T_j = 125 °C		-	10	30	mA
		T_j = 25 °C	V_R = 70 V	-	5		µA
		T_j = 125 °C		-	5		mA
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 5 A	-	565		mV
		T_j = 125 °C		-	480		
		T_j = 25 °C	I_F = 10 A	-	685		
		T_j = 125 °C		-	560	620	
		T_j = 25 °C	I_F = 20 A	-	800	900	
		T_j = 125 °C		-	630	700	

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:

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

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 (terminals 1 and 3 short circuited)

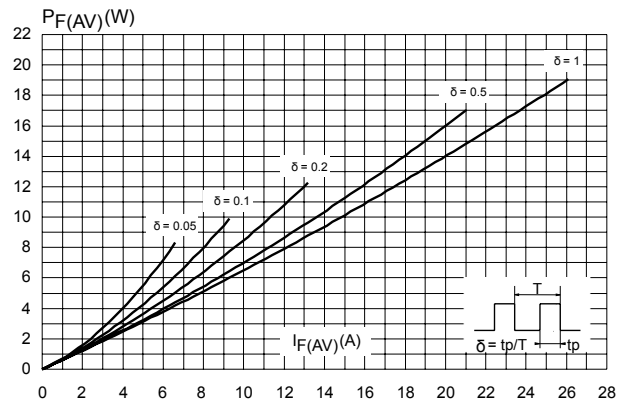


Figure 2. Average forward current versus ambient temperature (δ = 0.5, terminals 1 and 3 short circuited)

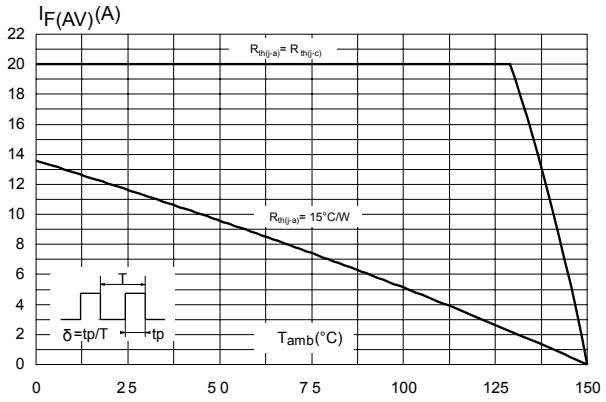


Figure 3. Normalized avalanche power derating versus pulse duration (T_j = 125 °C)

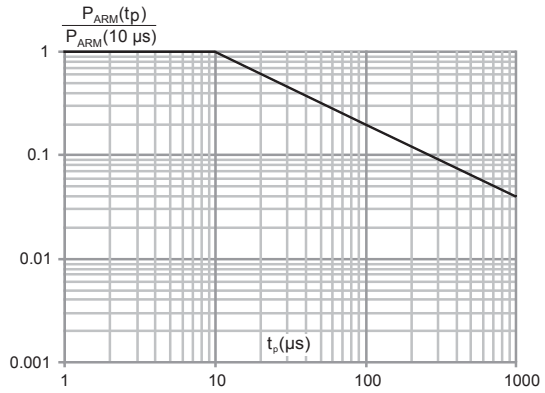


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

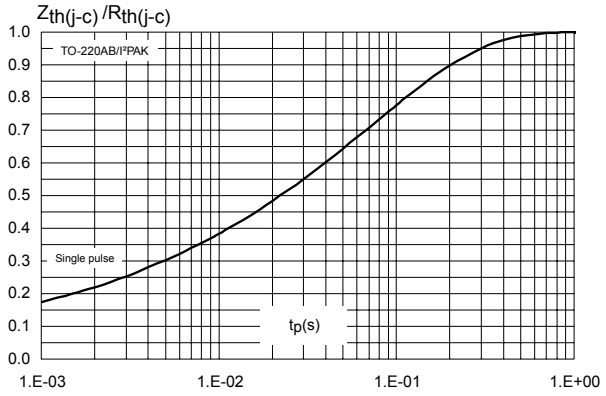


Figure 5. Reverse leakage current versus reverse voltage applied (typical values)

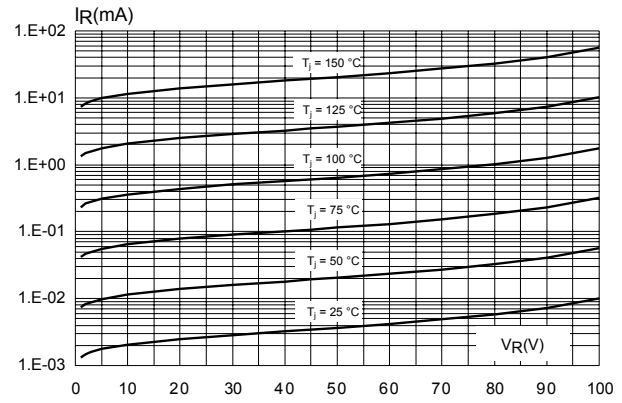


Figure 6. Junction capacitance versus reverse voltage applied (typical values)

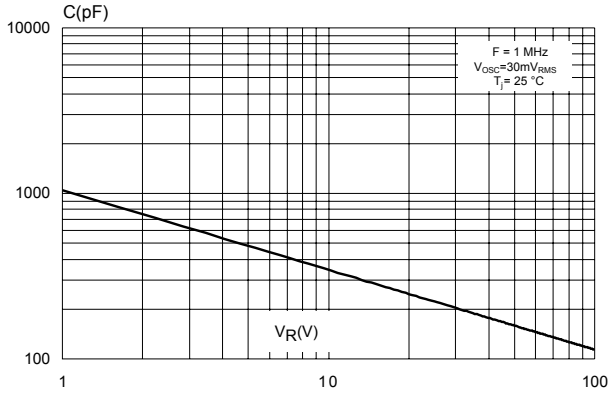
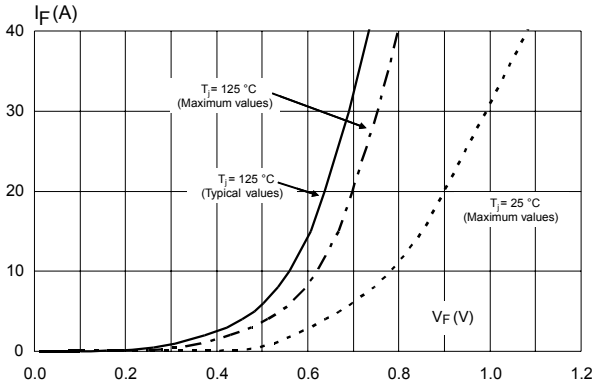


Figure 7. Forward voltage drop versus forward current (terminals 1 and 3 short circuited)



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

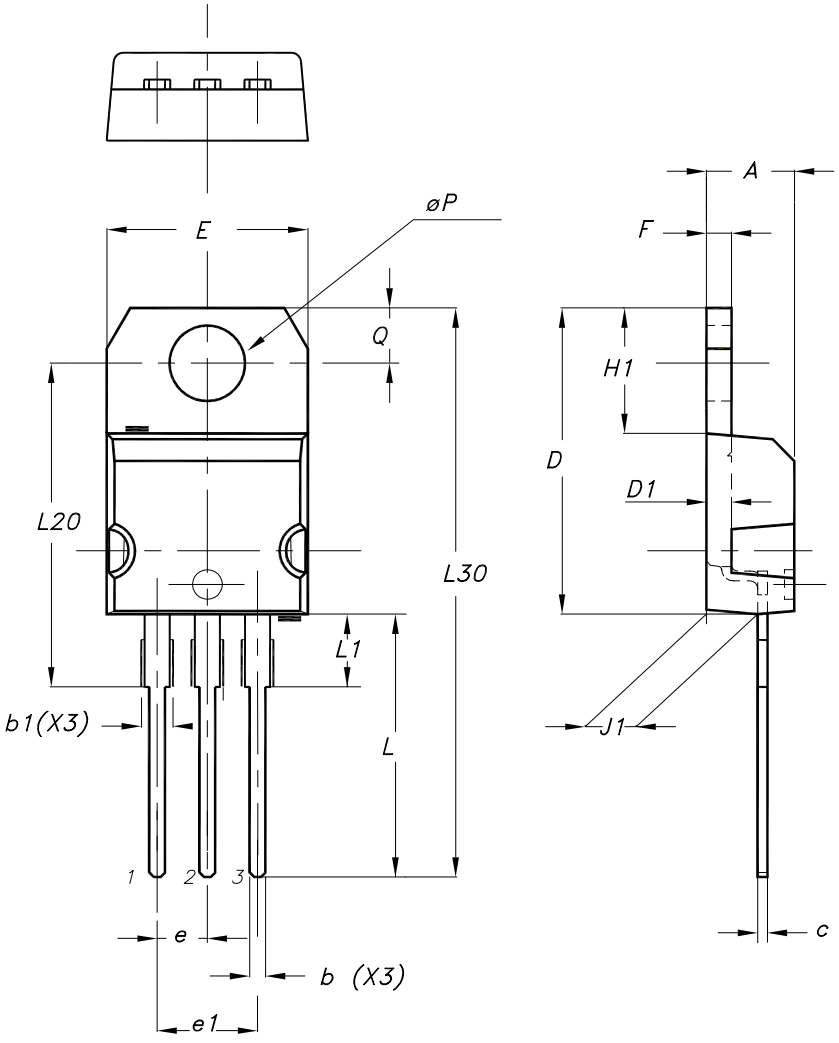


Table 4. TO-220AB package mechanical data

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

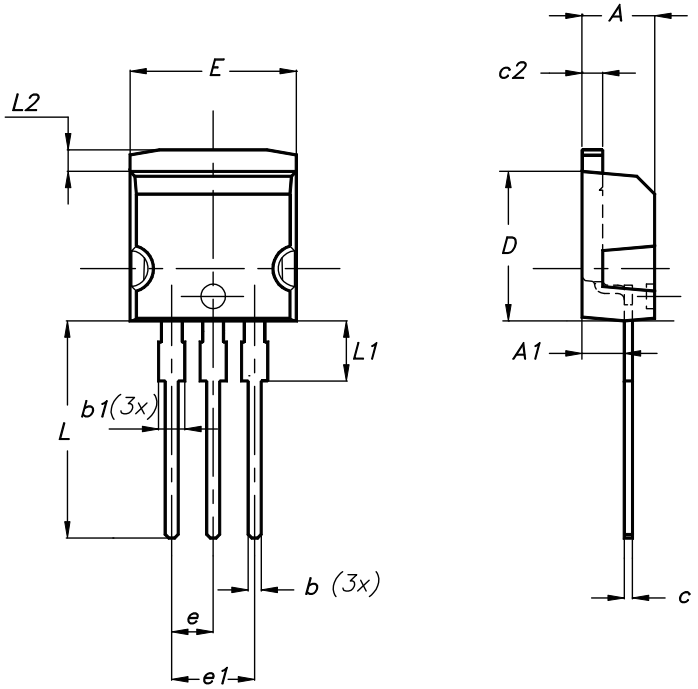


Table 5. I²PAK package mechanical data

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	I²PAK	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 *Table 5*.
11-May-2017	3	Removed TO-220FPAB and D²PAK 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.

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