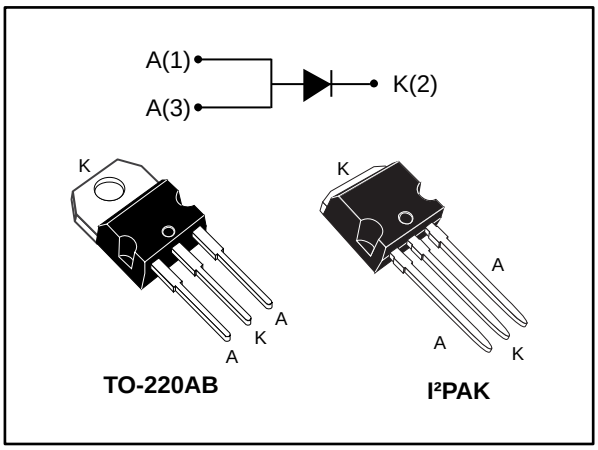
STPS20SM100S

Power Schottky rectifier

Datasheet - production data



Features

- High current capability
- Avalanche rated
- Low forward voltage drop current
- High frequency operation

Description

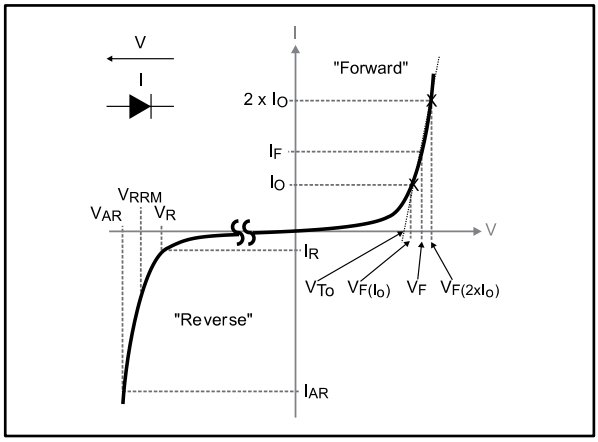
This single Schottky rectifier is suited for high frequency switch mode power supply.

Packaged in TO-220AB and I²PAK, this device 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.

Table 1: Device summary

Symbol	Value
$I_{F(AV)}$	20 A
V_{RRM}	100 V
T_j(max.)	150 °C
V_F(typ.)	0.63 V

Figure 1: Electrical characteristics



V_{ARM} and I_{ARM} must respect the reverse safe operating area defined in Figure 9. V_{AR} and I_{AR} are pulse measurements (t_p < 1 µs). V_R, I_R, V_{RRM} and V_F, are static characteristics.

1 Characteristics

Table 2: 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}(1)	Repetitive peak avalanche power	t_p = 10 µs, T_j = 125 °C	1080	W
V_{ARM}(2)	Maximum repetitive peak avalanche voltage	t_p < 1 µs, T_j < 150 °C, I_{AR} < 37.5 A	120	V
V_{ASM}(2)	Maximum single pulse peak avalanche voltage			
T_{stg}	Storage temperature range		-65 to +150	°C
T_j	Maximum operating junction temperature (3)		150	°C

Notes:

(1)For pulse time duration deratings, please refer to figure 4. More details regarding the avalanche energy measurements and diode validation in the avalanche are provided in the application notes AN1768 and AN2025.

(2)See Figure 9

(3)$(dP_{tot}/dT_j) < (1/R_{th(j-a)})$ condition to avoid thermal runaway for a diode on its own heatsink.

Table 3: Thermal parameters

Symbol	Parameter	Max. value	Unit
$R_{th(j-c)}$	Junction to case	1.3	°C/W

Table 4: 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	

Notes:

(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:

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

1.1 Characteristics (curves)

Figure 2: Average forward power dissipation versus average forward current

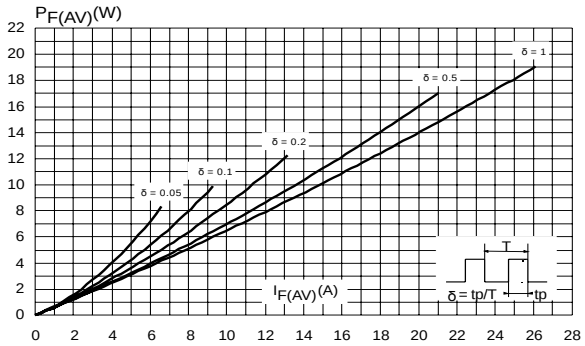


Figure 3: Average forward current versus ambient temperature (δ = 0.5)

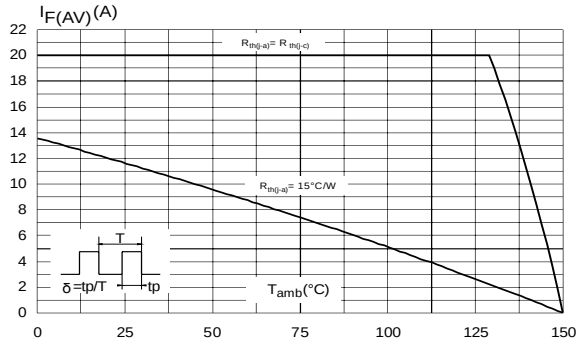


Figure 4: Normalized avalanche power derating versus pulse duration (T_j = 125 °C)

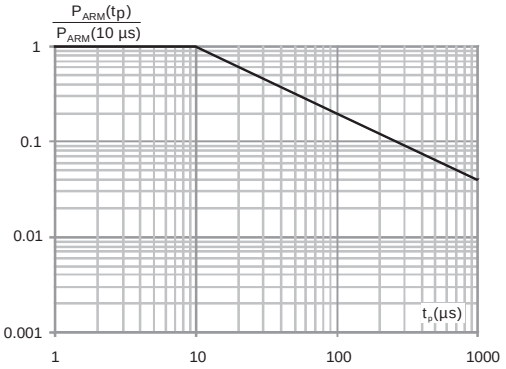


Figure 5: Relative variation of thermal impedance junction to case versus pulse duration

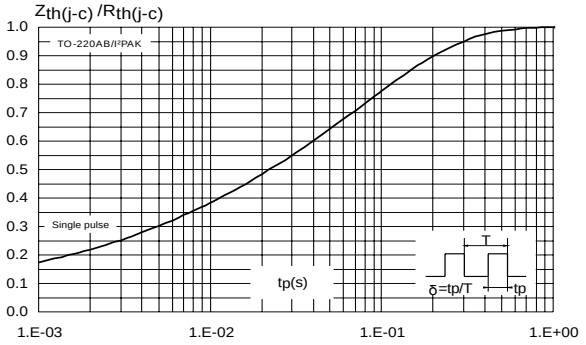


Figure 6: Reverse leakage current versus reverse voltage applied (typical values)

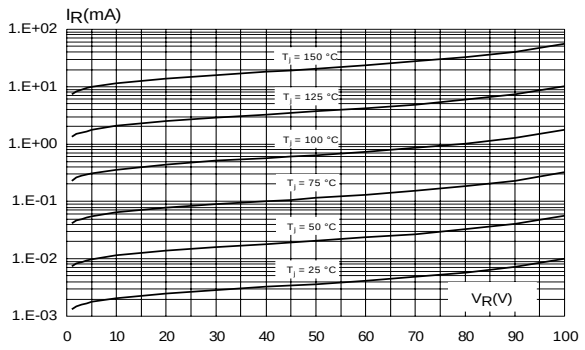


Figure 7: Junction capacitance versus reverse voltage applied (typical values)

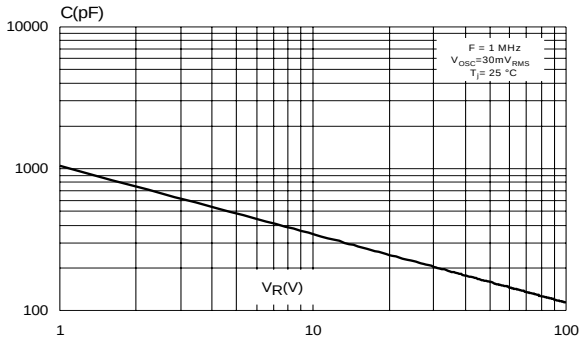


Figure 8: Forward voltage drop versus forward current (terminals 1 and 3 short circuited)

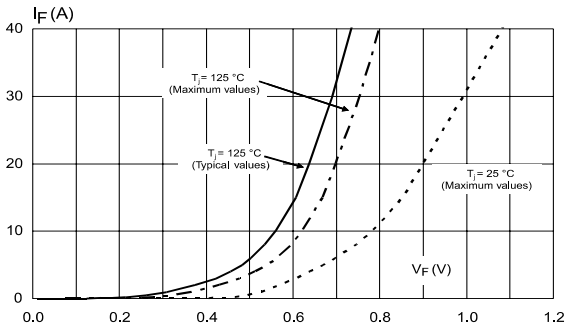
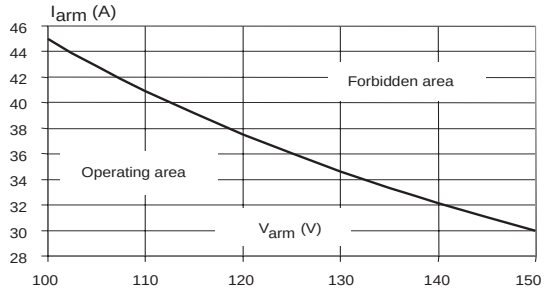


Figure 9: Reverse safe operating area (t_p < 1 µs and T_j < 150 °C)



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.

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0
- Recommended torque value: 0.55 N·m (for TO-220AB)
- Maximum torque value: 0.7 N·m (for TO-220AB)

2.1 TO-220AB package information

Figure 10: TO-220AB package outline

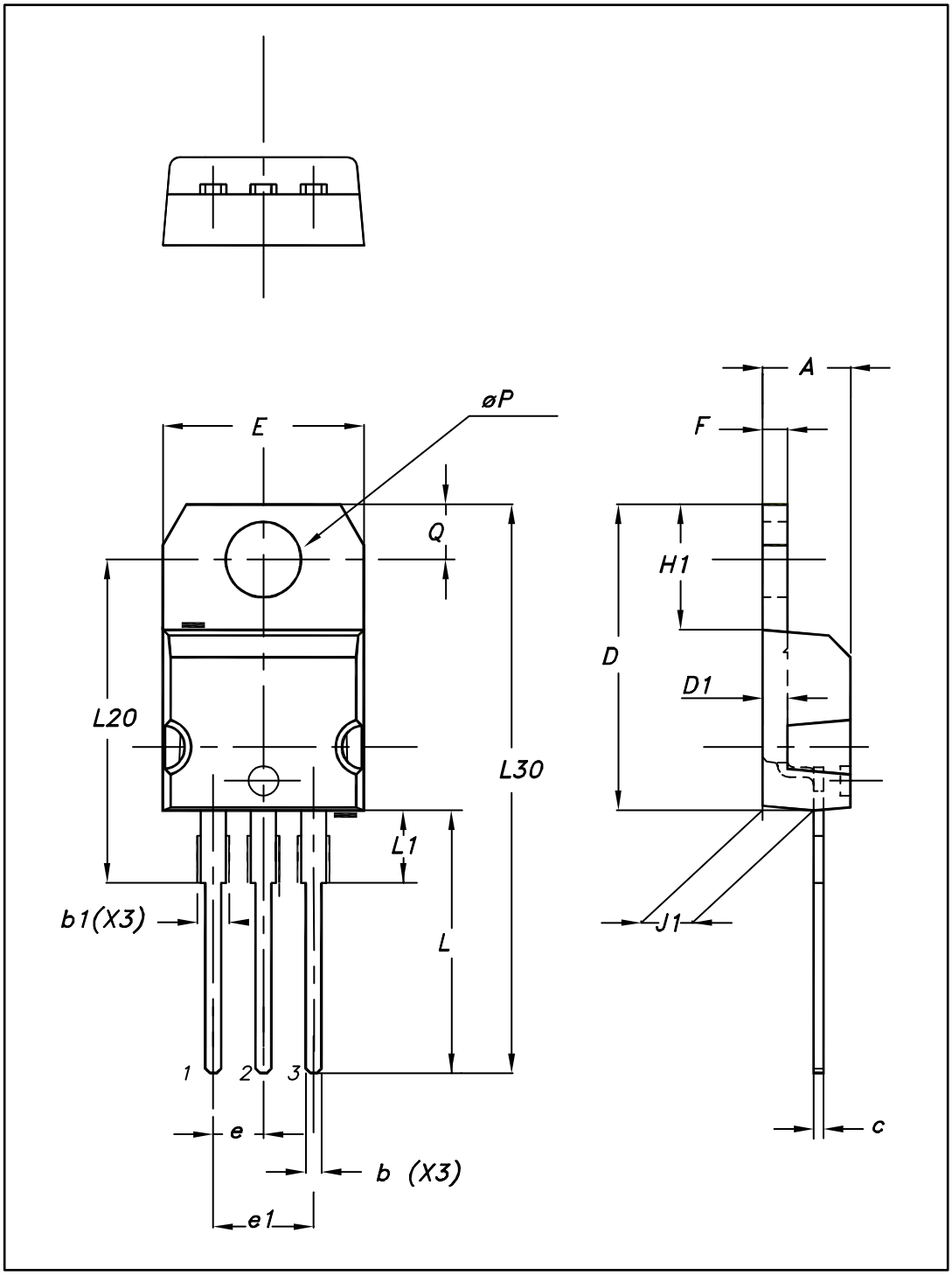


Table 5: TO-220AB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	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	1.70	0.045	0.067
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

Figure 11: I²PAK package outline

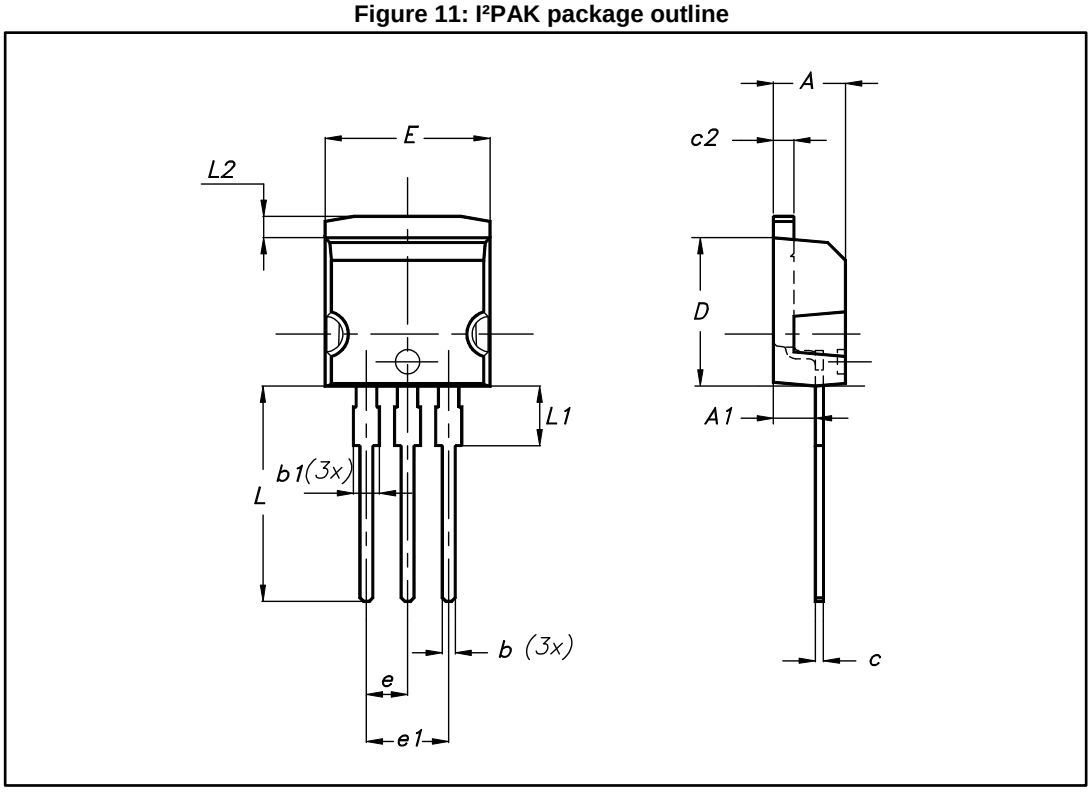


Table 6: I²PAK package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.40	0.72	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 7: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS20SM100ST	PS20SM100ST	TO-220AB	1.95 g	50	Tube
STPS20SM100SR	PS20SM100SR	I²PAK	1.5 g	50	Tube

4 Revision history

Table 8: 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.

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