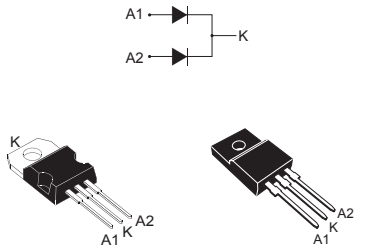
STPS20S100C

Datasheet

100 V power Schottky rectifier



TO-220AB **TO-220FPAB**

Features

- High junction temperature capability for converters located in confined environment
- Low leakage current at high temperature
- Low static and dynamic losses as a result of the Schottky barrier
- Avalanche specification
- ECOPACK®2 compliant

Applications

- Switching diode
- SMPS
- DC/DC converter
- LED lighting
- Desktop power supply

Description

Schottky barrier rectifier designed for high frequency miniature switched mode power supplies such as adaptors and on board DC/DC converters.

The STPS20S100C is housed in TO-220AB and TO-220FPAB packages.

Product status link	
STPS20S100C	
Product summary	
Symbol	**Value**
$I_{F(AV)}$	2 x 10 A
V_{RRM}	100 V
T_j	175 °C
V_F (typ.)	0.66 V

1 Characteristics

Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified, per diode)

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	TO-220AB	T_c = 155 °C, δ = 0.5	Per diode	10	A
			T_c = 150 °C, δ = 0.5	Per device	20	
		TO-220FPAB	T_c = 135 °C, δ = 0.5	Per diode	10	
			T_c = 115 °C, δ = 0.5	Per device	20	
I_{FSM}	Surge non repetitive forward current		t_p = 10 ms sinusoidal		180	A
P_{ARM}	Repetitive peak avalanche power		t_p = 10 µs, T_j = 125 °C		518	W
T_{stg}	Storage temperature range				-65 to +175	°C
T_j	Maximum operating junction temperature(1)				175	°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			Max. value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AB	Per diode	2.2	°C/W
			Total	1.3	
		TO-220FPAB	Per diode	4.5	
			Total	3.5	
$R_{th(c)}$	Coupling	TO-220AB		0.3	
		TO-220FPAB		2.5	

When the diodes 1 and 2 are used simultaneously :
ΔT_j(diode 1) = P(diode1) x $R_{th(j-c)}$(per diode) + P(diode 2) x $R_{th(c)}$

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	$V_R = V_{RRM}$	-		3.5	µA
		T_j = 125 °C		-	1.3	4.5	mA

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_F[(2)]	Forward voltage drop	T_j = 25 °C	I_F = 5 A	-		0.73	V
		T_j = 125 °C		-	0.57	0.61	
		T_j = 25 °C	I_F = 10 A	-		0.85	
		T_j = 125 °C		-	0.66	0.71	
		T_j = 25 °C	I_F = 20 A	-		0.94	
		T_j = 125 °C		-	0.74	0.80	

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:

$P = 0.62 \times I_{F(AV)} + 0.009 \times I_F{}^2{}_{(RMS)}$

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)

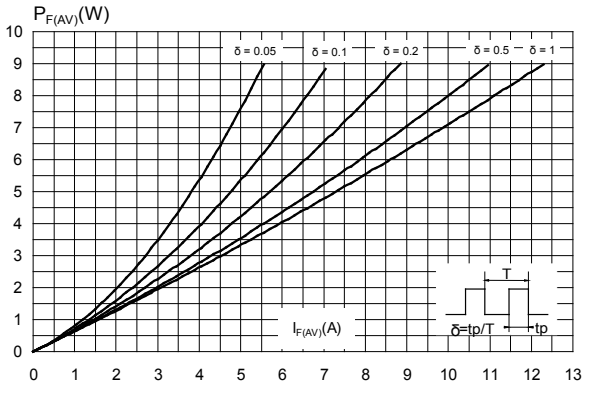


Figure 2. Average forward current versus ambient temperature (δ = 0.5, per diode)

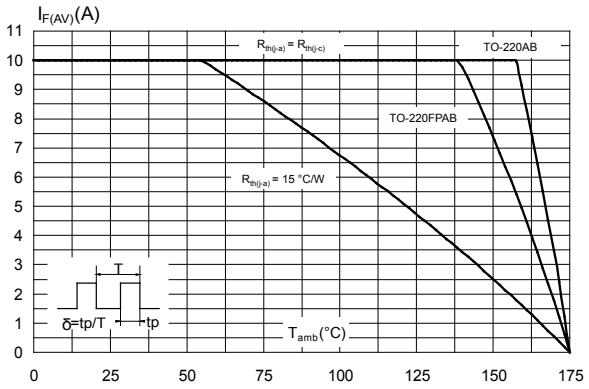


Figure 3. Normalized avalanche power derating versus pulse duration (T_j = 125 °C)

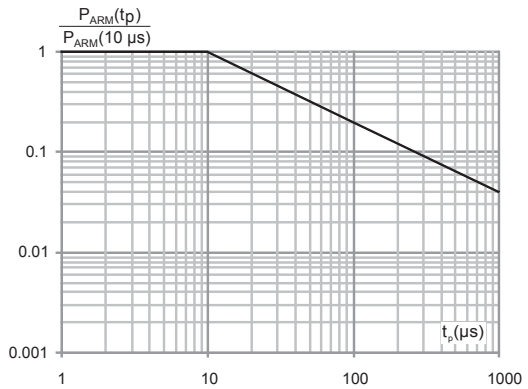


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB)

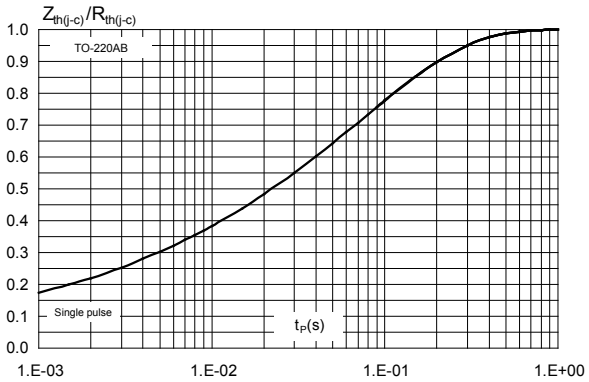


Figure 5. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

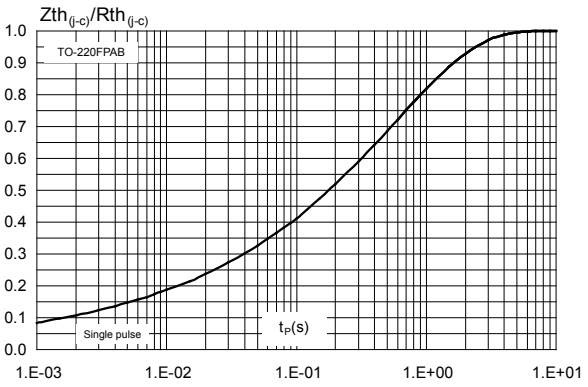


Figure 6. Reverse leakage current versus reverse voltage applied (typical values, per diode)

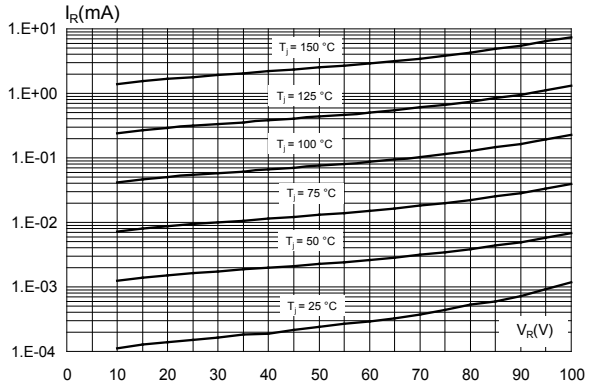


Figure 7. Junction capacitance versus reverse voltage applied (typical values, per diode)

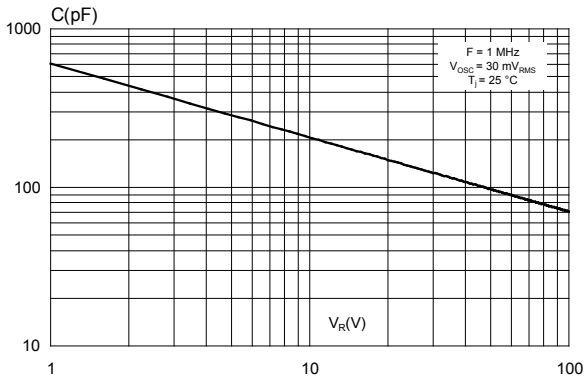
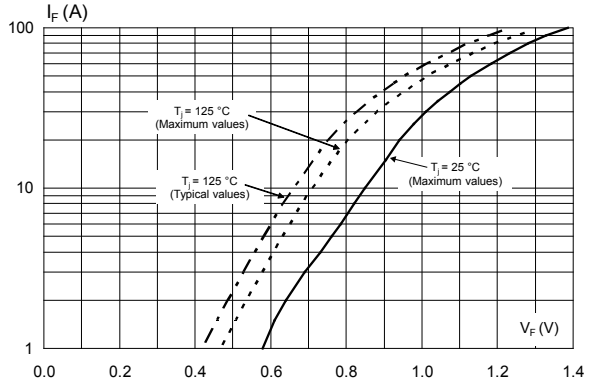


Figure 8. Forward voltage drop versus forward current (per diode)



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-220FPAB 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 9. TO-220FPAB package outline

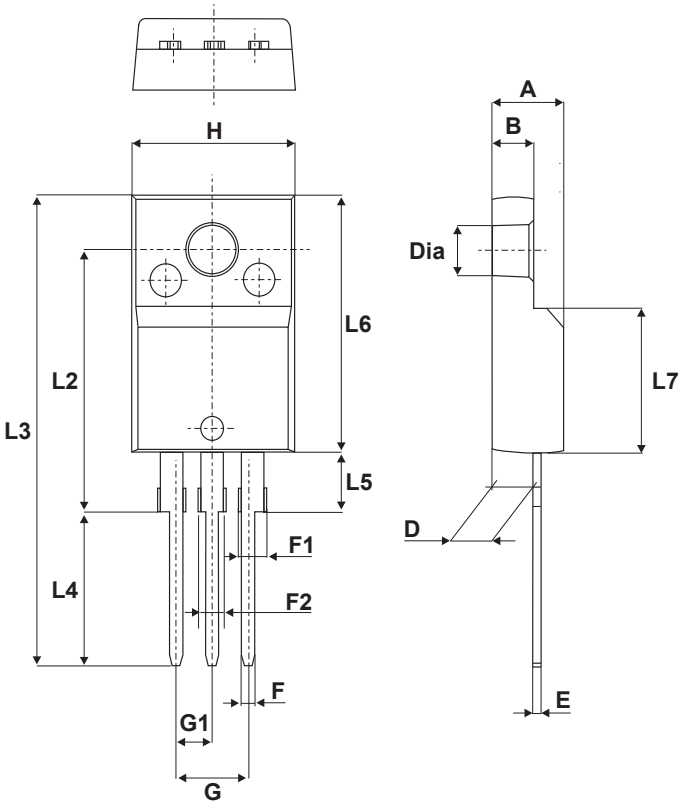


Table 4. **TO-220FPAB package mechanical data**

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
B	2.50	2.70	0.098	0.106
D	2.50	2.75	0.098	0.108
E	0.45	0.70	0.018	0.027
F	0.75	1.00	0.03	0.039
F1	1.15	1.70	0.045	0.067
F2	1.15	1.70	0.045	0.067
G	4.95	5.20	0.195	0.205
G1	2.40	2.70	0.094	0.106
H	10.00	10.40	0.393	0.409
L2	16.00 typ.		0.63 typ.	
L3	28.60	30.60	1.126	1.205
L4	9.80	10.60	0.386	0.417
L5	2.90	3.60	0.114	0.142
L6	15.90	16.40	0.626	0.646
L7	9.00	9.30	0.354	0.366
Dia	3.00	3.20	0.118	0.126

2.2 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 10. TO-220AB package outline

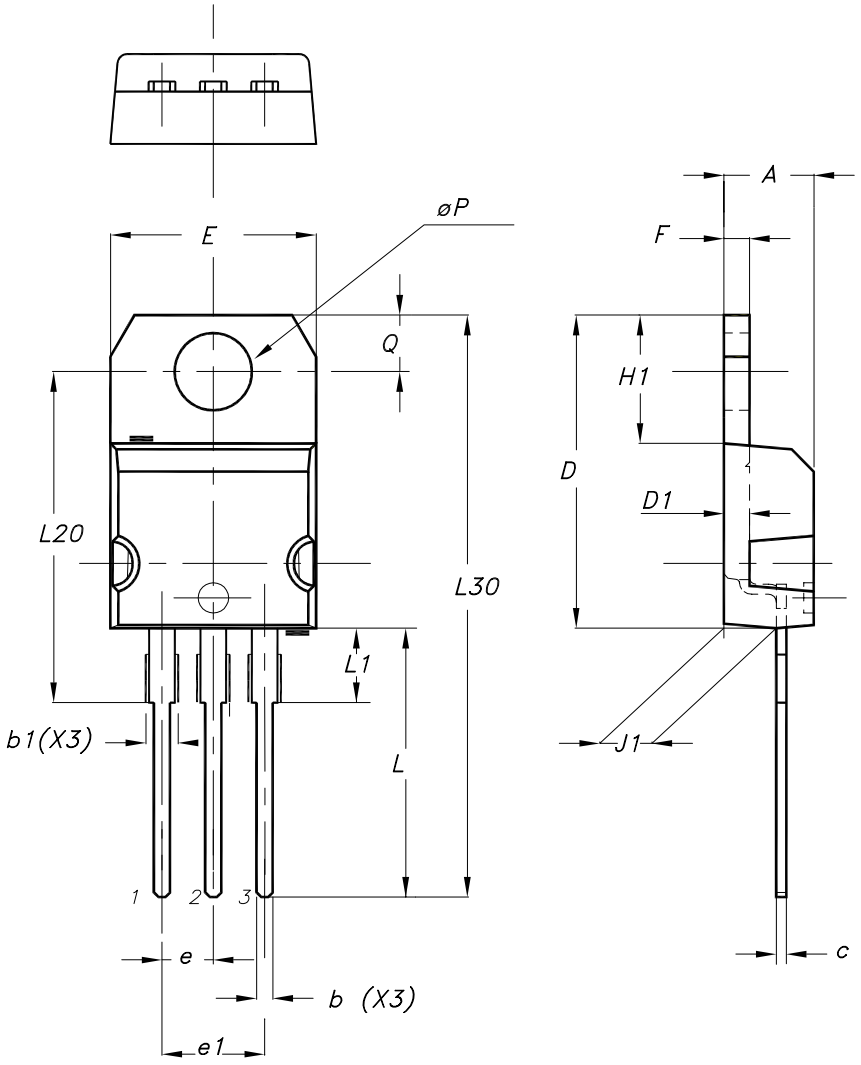


Table 5. TO-220AB package mechanical data

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	1.55	0.045	0.061

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
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

3 Ordering information

Table 6. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS20S100CT	STPS20S100CT	TO-220AB	1.95 g	50	Tube
STPS20S100CFP	STPS20S100CFP	TO-220FPAB	1.90 g		

Revision history

Table 7. **Document revision history**

Date	Version	Changes
16-Mar-2005	1	First issue.
03-Feb-2010	2	Added cathode indicator K to illustration of TO-220AB on cover page. Changed parameter in Table 2 from " RMS forward voltage " to " Forward rms current ".
11-May-2018	3	Removed figure 4, figure 5 and figure 6. Updated Figure 3. Normalized avalanche power derating versus pulse duration (T_j = 125 °C), Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified, per diode), Figure 4. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB) and Figure 5. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB). Updated Section 3 Ordering information. Removed I²PAK package. Minor text changes to improve readability.