STPS20S100C

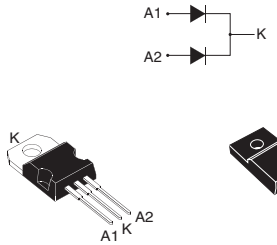
100 V, 20 A power Schottky rectifier

Features

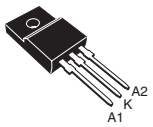
- High junction temperature capability for converters located in confined enrironment
- Low leakage current at high temperature
- Low static and dynamic losses as a result of the Schottky barrier
- Avalanche specification

Description

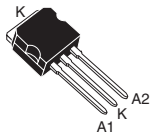
Schottky barrier rectifier designed for high frequency miniature switched mode power supplies such as adaptators and on board dc/dc converters. The device is packaged in TO-220AB, I^2PAK and TO-220FPAB.



TO-220AB
STPS20S100CT



TO-220FPAB
STPS20S100CFP



I^2PAK
STPS20S100CR

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 x 10 A
V_{RRM}	100 V
T_j	175 °C
V_F(max)	0.71 V

1 Characteristics

Table 2. Absolute ratings (limiting values, 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 $\delta = 0.5$	TO-220AB / I^2PAK	T_c = 150 °C	Per diode Per device	10 20	A
		TO-220FPAB	T_c = 140 °C	Per diode Per device	10 20	
I_{FSM}	Surge non repetitive forward current		t_p = 10ms sinusoidal		180	A
P_{ARM}	Repetitive peak avalanche power		t_p = 1µs T_j = 25 °C		7200	W
T_{stg}	Storage temperature range				-65 to + 175	°C
T_j	Maximum operating junction temperature (1)				175	°C
dV/dt	Critical rate of rise of reverse voltage				10000	V/µs

1. $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ condition to avoid thermal runaway for a diode on its own heatsink

Table 3. Thermal resistance

Symbol	Parameter			Value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AB / I^2PAK	Per diode	2.2	°C/W
			Total	1.3	
$R_{th(c)}$			Coupling	0.3	
$R_{th(j-c)}$	Junction to case	TO-220FPAB	Per diode	4.5	°C/W
			Total	3.5	
$R_{th(c)}$			Coupling	2.5	

When the diodes 1 and 2 are used simultaneously:

$\Delta T_{j(diode\ 1)} = P_{(diode\ 1)} \times R_{th(j-c)(Per\ diode)} + P_{(diode\ 2)} \times R_{th(c)}$

Table 4. Static electrical characteristics (per diode)

Symbol	Parameter	Tests 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
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: $P = 0.62 \times I_{F(AV)} + 0.009\ I_{F^2(RMS)}$

Figure 1. Average forward power dissipation versus average forward current (per diode)

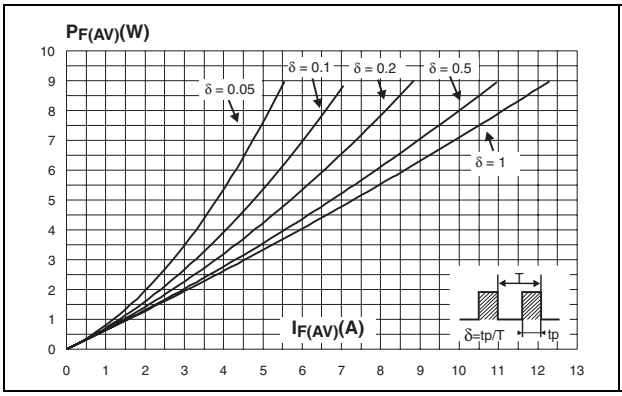


Figure 2. Average forward current versus ambient temperature (δ = 0.5, per diode)

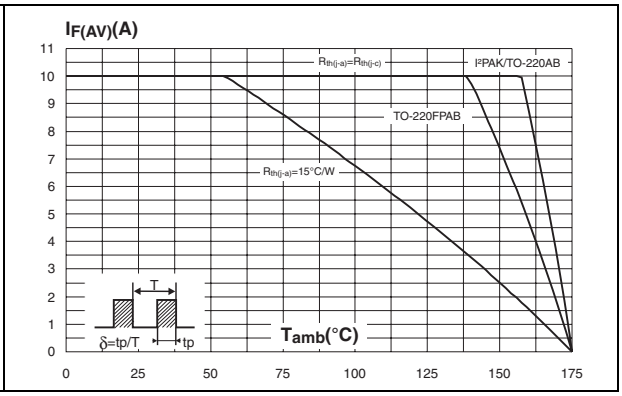


Figure 3. Normalized avalanche power derating versus pulse duration

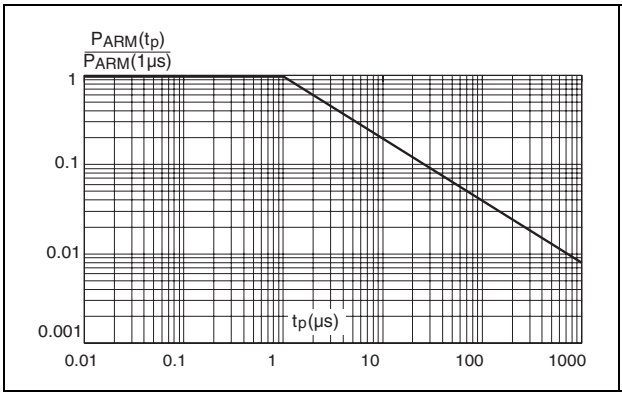


Figure 4. Normalized avalanche power derating versus junction temperature

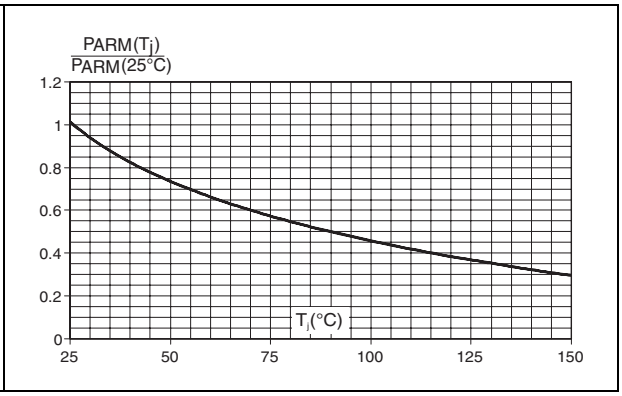


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)

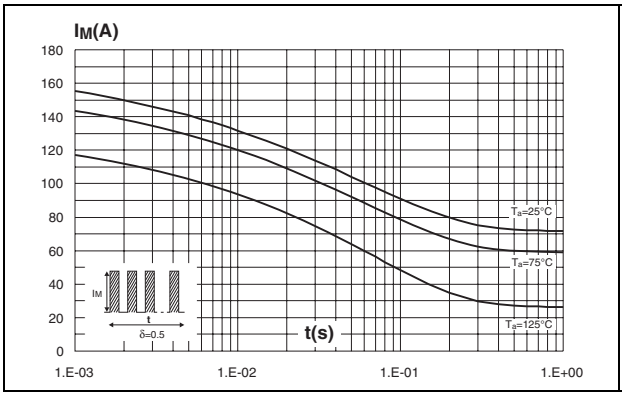


Figure 6. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)

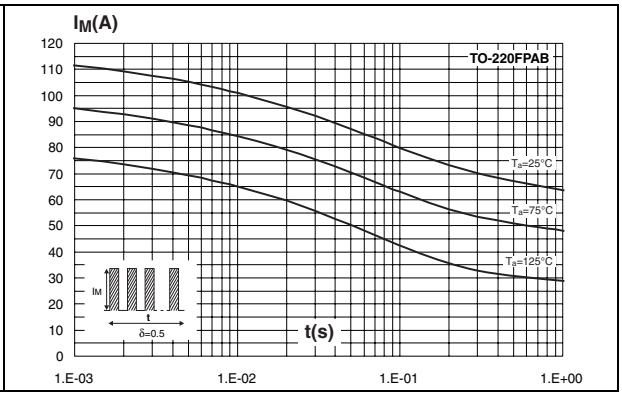


Figure 7. Relative variation of thermal impedance junction to case versus pulse duration (per diode)

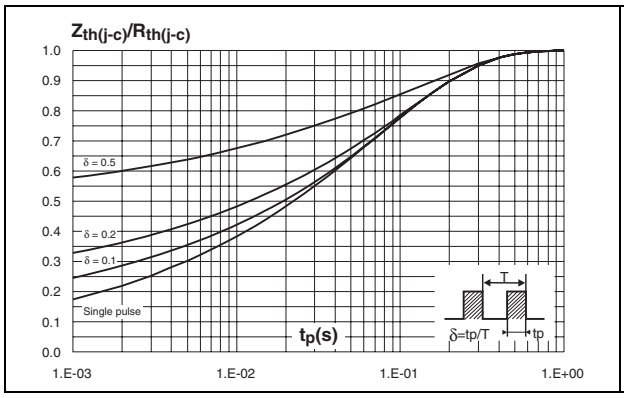


Figure 8. Relative variation of thermal impedance junction to case versus pulse duration (per diode) (TO-220FPAB)

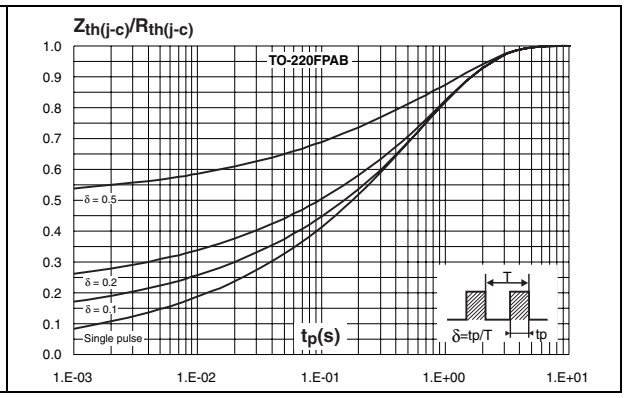


Figure 9. Reverse leakage current versus reverse voltage applied (typical values, per diode)

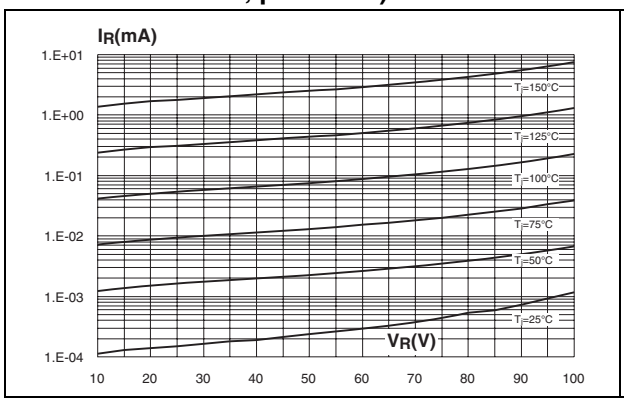


Figure 10. Junction capacitance versus reverse voltage applied (typical values, per diode)

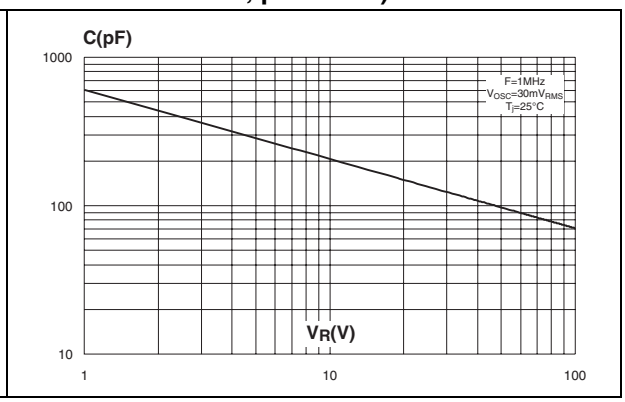
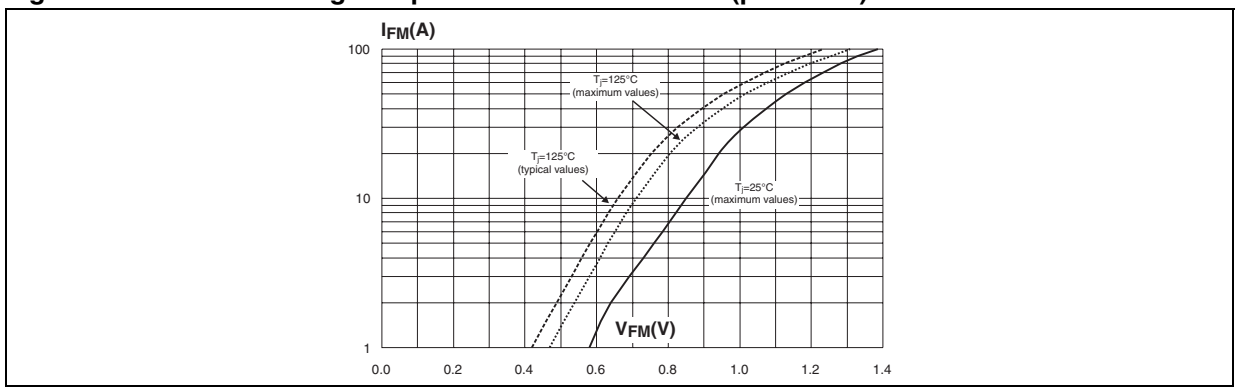


Figure 11. Forward voltage drop versus forward current (per diode)

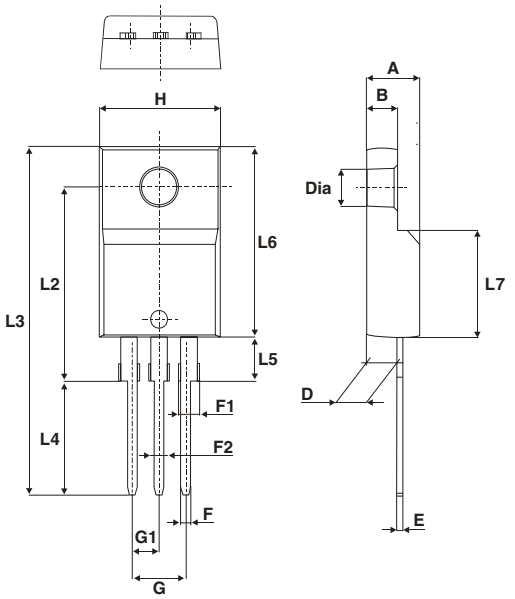


2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.4 to 0.6 N·m

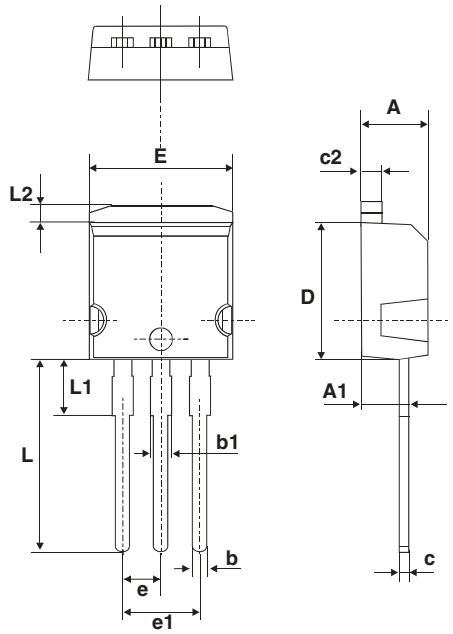
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Table 5. TO-220FPAB dimensions



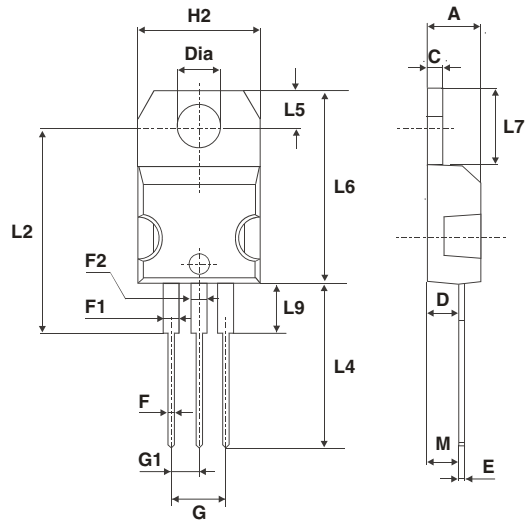
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.4	4.6	0.173	0.181
B	2.5	2.7	0.098	0.106
D	2.5	2.75	0.098	0.108
E	0.45	0.70	0.018	0.027
F	0.75	1	0.030	0.039
F1	1.15	1.70	0.045	0.067
F2	1.15	1.70	0.045	0.067
G	4.95	5.20	0.195	0.205
G1	2.4	2.7	0.094	0.106
H	10	10.4	0.393	0.409
L2	16 Typ.		0.63 Typ.	
L3	28.6	30.6	1.126	1.205
L4	9.8	10.6	0.386	0.417
L5	2.9	3.6	0.114	0.142
L6	15.9	16.4	0.626	0.646
L7	9.00	9.30	0.354	0.366
Dia.	3.00	3.20	0.118	0.126

Table 6. I^2PAK dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	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	10.40	0.394	0.409
L	13	14	0.512	0.551
L1	3.50	3.93	0.138	0.155
L2	1.27	1.40	0.050	0.055

Table 7. TO-220AB dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
F2	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
G1	2.40	2.70	0.094	0.106
H2	10	10.40	0.393	0.409
L2	16.4 typ.		0.645 typ.	
L4	13	14	0.511	0.551
L5	2.65	2.95	0.104	0.116
L6	15.25	15.75	0.600	0.620
L7	6.20	6.60	0.244	0.259
L9	3.50	3.93	0.137	0.154
M	2.6 typ.		0.102 typ.	
Diam.	3.75	3.85	0.147	0.151

3 Ordering information

Table 8. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS20S100CT	STPS20S100CT	TO-220AB	2.20 g	50	Tube
STPS20S100CFP	STPS20S100CFP	TO-220FPAB	2 g	50	Tube
STPS20S100CR	STPS20S100CR	I^2PAK	1.49 g	50	Tube

4 Revision history

Table 9. Document revision history

Date	Revision	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 “.