STPS30M100S

100 V, 30 A power Schottky rectifier

Features

- Avalanche rated
- Low V_F
- Good trade off between leakage current and forward voltage drop
- High frequency operation
- Avalanche capability specified

Description

The STPS30M100S device is a single Schottky rectifier, suited for high frequency switch mode power supply.

Packaged in TO-220AB, TO-220FPAB, and I^2PAK this device is intended to be used in notebook and game station adaptors, providing in these applications a good efficiency at both low and high load.

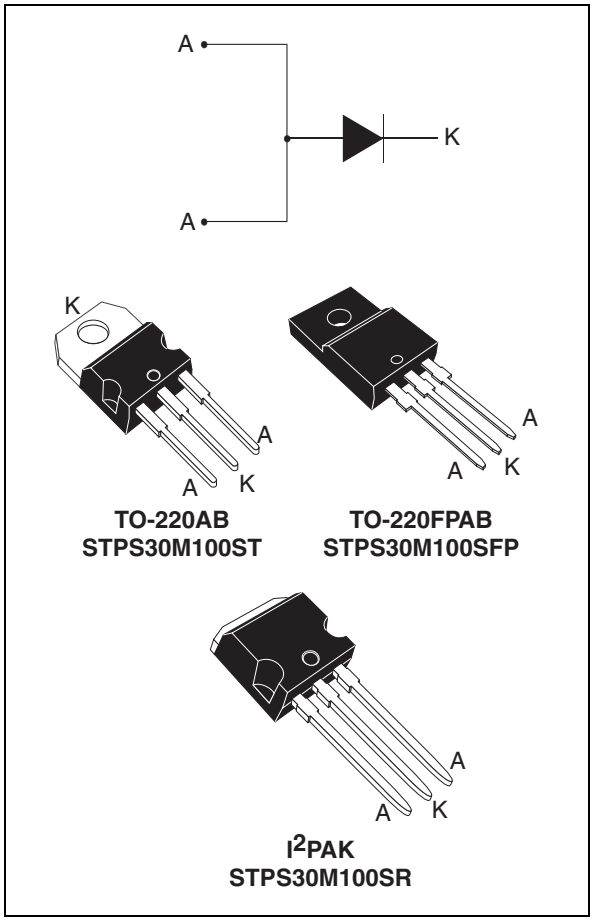


Figure 1. Electrical characteristics (a)

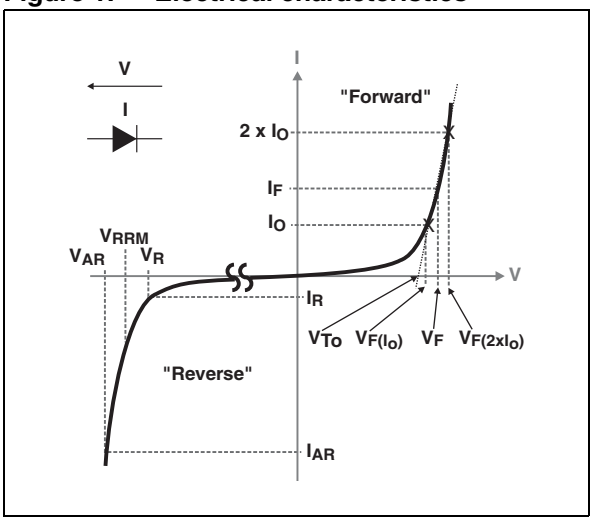


Table 1. Device summary

$I_{F(AV)}$	30 A
V_{RRM}	100 V
T_j (max)	150 °C
V_F(typ)	0.385 V

a. V_{ARM} and I_{ARM} must respect the reverse safe operating area defined in *Figure 14.* 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)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		100	V
$I_{F(RMS)}$	Forward rms current		60	A
$I_{F(AV)}$	Average forward current $\delta = 0.5$	$T_c = 125$ °C	30	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10$ ms sinusoidal	300	A
P_{ARM}	Repetitive peak avalanche power	$t_p = 1$ µs $T_j = 25$ °C	26400	W
V_{ARM} (1)	Maximum repetitive peak avalanche voltage	$t_p < 1$ µs $T_j < 150$ °C $I_{AR} < 66$ A	120	V
V_{ASM} (1)	Maximum single pulse peak avalanche voltage	$t_p < 1$ µs $T_j < 150$ °C $I_{AR} < 66$ A	120	V
T_{stg}	Storage temperature range		-65 to + 175	°C
T_j	Maximum operating junction temperature (2)		150	°C

1. Refer to *Figure 14.*
2. $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ 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	1	°C/W
		TO-220FPAB	4	

Table 4. Static electrical characteristics with all leads connected on board

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	$T_j = 25$ °C	$V_R = V_{RRM}$	-	-	175	µA
		$T_j = 125$ °C		-	20	50	mA
		$T_j = 25$ °C	$V_R = 70$ V	-	-	60	µA
		$T_j = 125$ °C		-	10	20	mA
V_F(2)	Forward voltage drop	$T_j = 25$ °C	$I_F = 5$ A	-	0.475	-	V
		$T_j = 125$ °C		-	0.385	-	
		$T_j = 25$ °C	$I_F = 10$ A	-	0.555	-	
		$T_j = 125$ °C		-	0.475	--	
		$T_j = 25$ °C	$I_F = 15$ A	-	0.620	0.660	
		$T_j = 125$ °C		-	0.525	0.565	
		$T_j = 25$ °C	$I_F = 30$ A	-	0.740	0.800	
		$T_j = 125$ °C		-	0.605	0.655	

1. Pulse test: $t_p = 5$ ms, $\delta < 2\%$
2. Pulse test: $t_p = 380$ µs, $\delta < 2\%$

To evaluate the conduction losses use the following equation:
$P = 0.475 \times I_{F(AV)} + 0.006 \times I_{F}^{2}{}_{(RMS)}$

Figure 2. Conduction losses versus average current

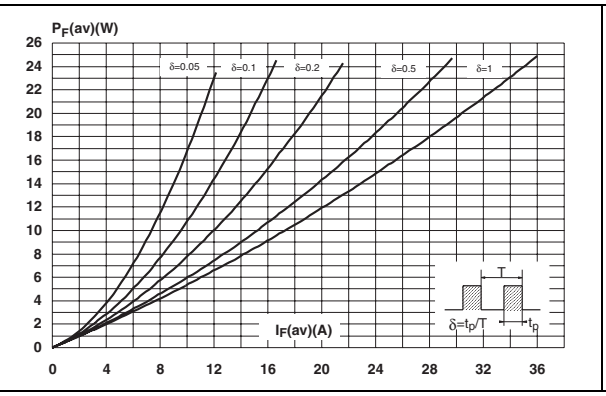


Figure 3. Average forward current versus ambient temperature (δ = 0.5)

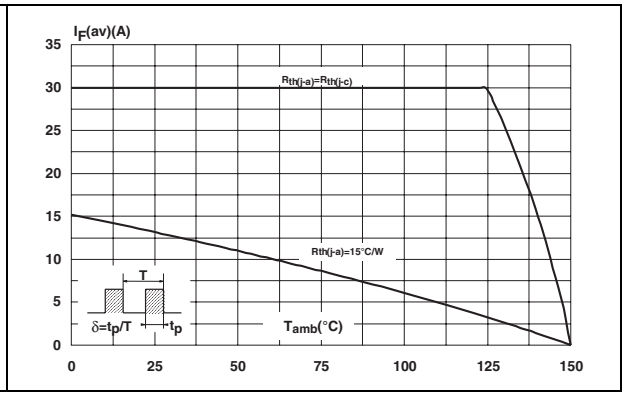


Figure 4. Normalized avalanche power derating versus pulse duration

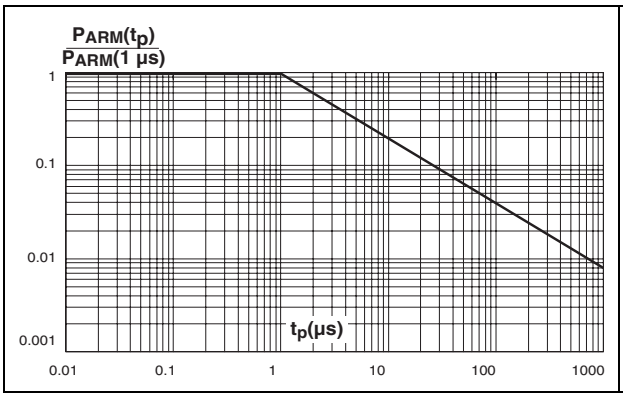


Figure 5. Normalized avalanche power derating versus junction temperature

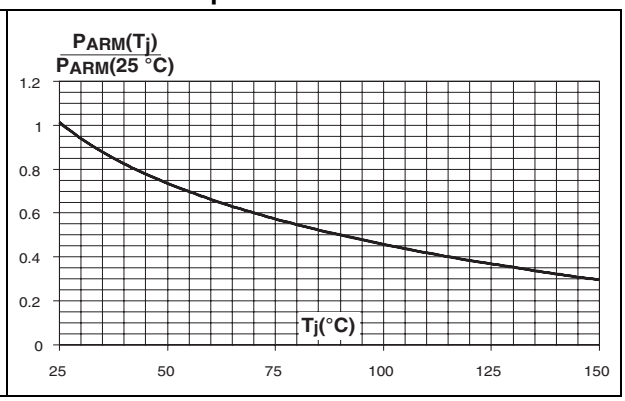


Figure 6. Non repetitive surge peak forward current versus overload duration (maximum values)

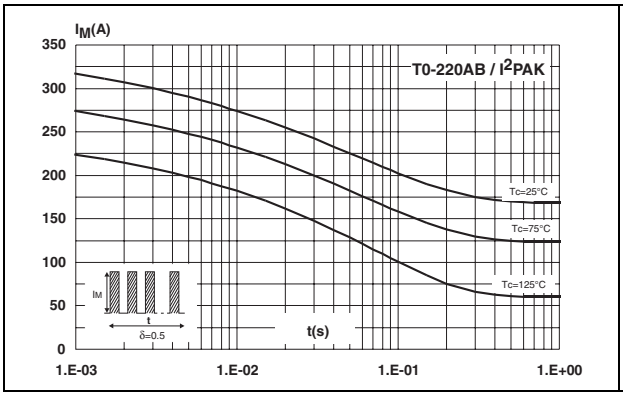


Figure 7. Relative variation of thermal impedance junction to case versus pulse duration

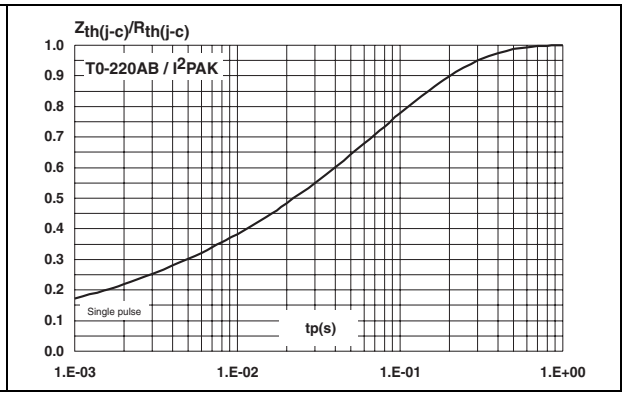


Figure 8. Non repetitive surge peak forward current versus overload duration (maximum values) (TO-220FPAB)

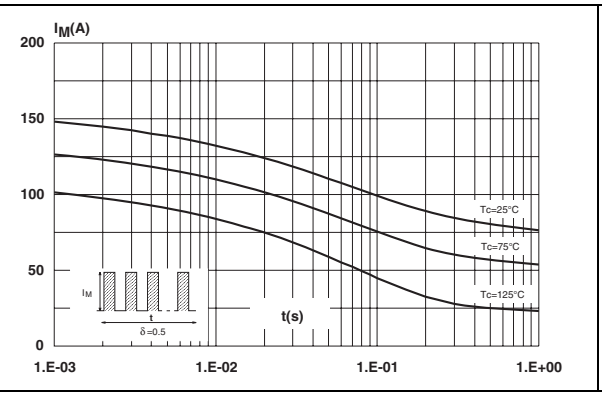


Figure 9. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

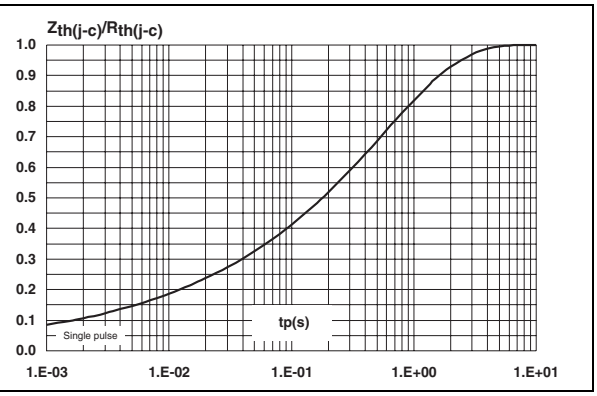


Figure 10. Reverse leakage current versus reverse voltage applied (typical values)

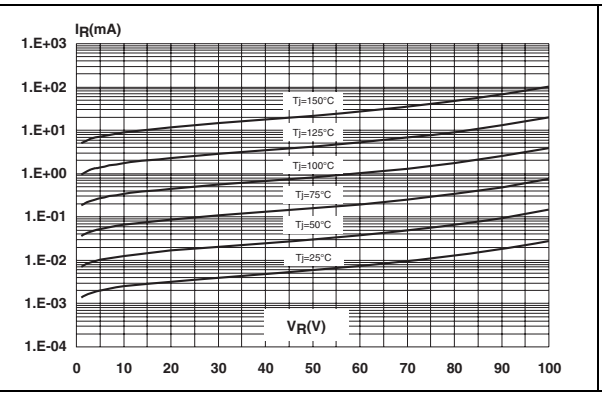


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

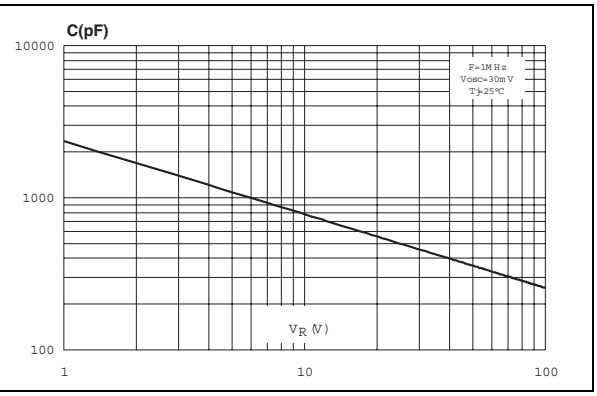


Figure 12. Forward voltage drop versus forward current (high level)

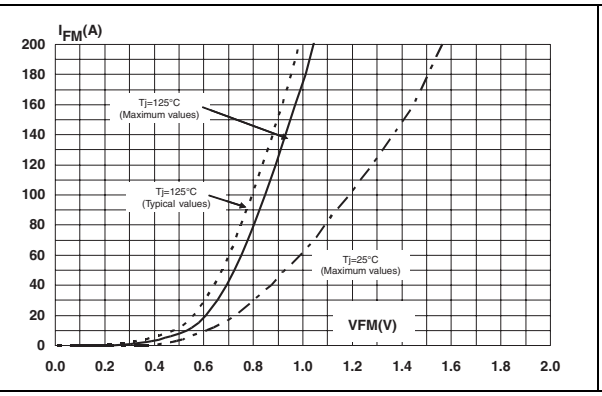


Figure 13. Forward voltage drop versus forward current (low level)

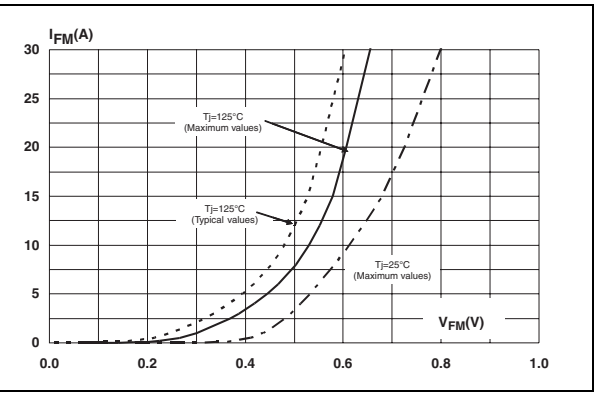
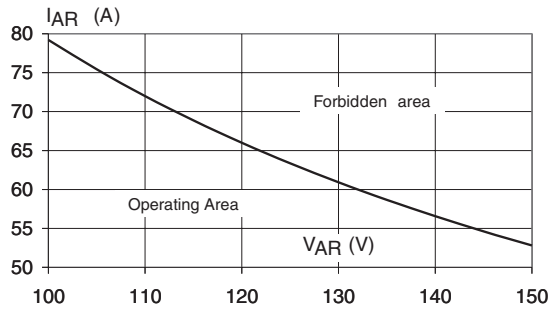


Figure 14. Reverse safe operating area (t_p < 1 µs and T_j < 150 °C)



2 Package Information

- Epoxy meets UL94,V0
- Recommended torque: 0.4 to 0.6 N·m

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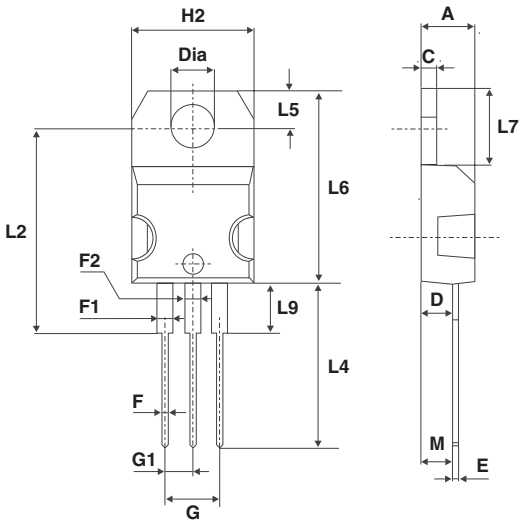
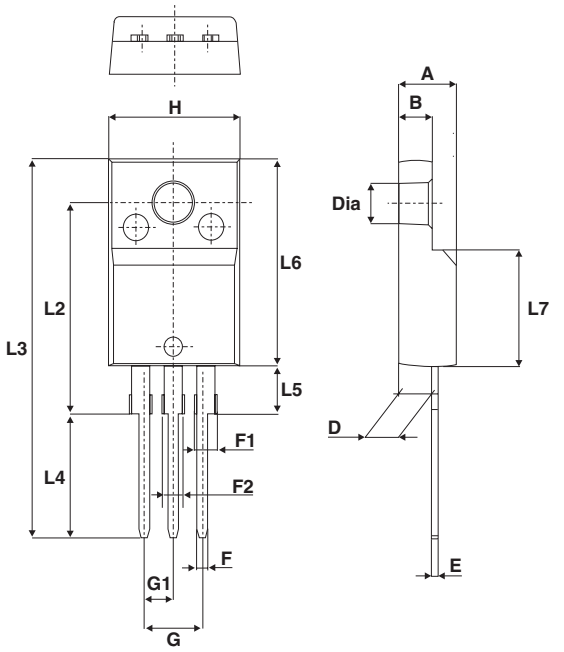
Table 5. TO-220AB dimensions



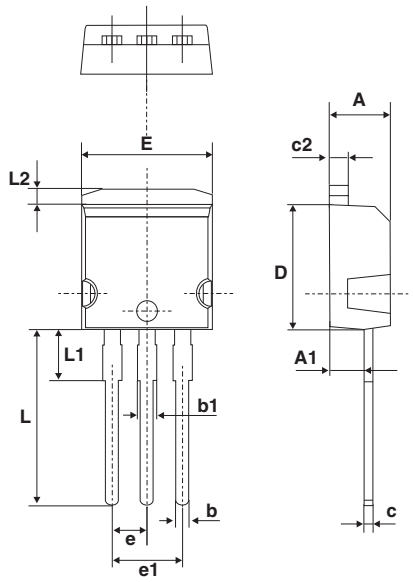
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
F2	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
G1	2.40	2.70	0.094	0.106
H2	10	10.40	0.393	0.409
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

Table 6. 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 7. 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

3 Ordering information

Table 8. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS30M100ST	STPS30M100ST	TO-220AB	2.3 g	50	Tube
STPS30M100SFP	STPS30M100SFP	TO-220FPAB	2.0 g	50	Tube
STPS30M100SR	STPS30M100SR	I^2PAK	1.49 g	50	Tube

4 Revision history

Table 9. Document revision history

Date	Revision	Changes
25-Mar-2009	1	First issue
15-Apr-2010	2	Updated package graphic on front page. Updated *Table 3*, *Table 5*, *Table 6*, and *Table 7*.

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