

## Power Schottky rectifier

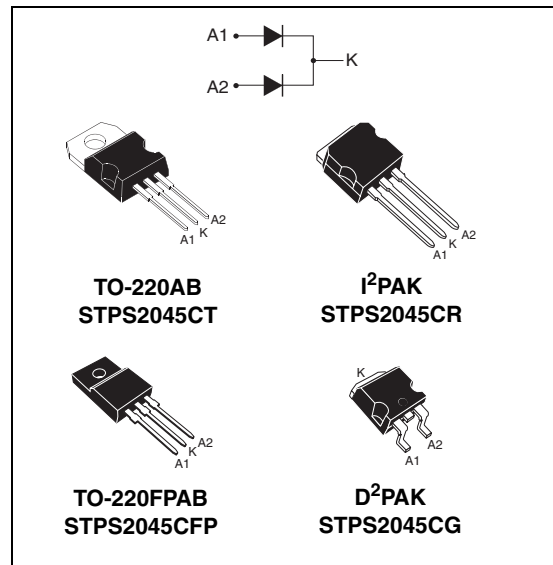
### Features

- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Insulated package: TO-220FPAB  
Insulating voltage = 2000 V DC  
Capacitance = 12 pF
- Avalanche rated

### Description

Dual center tap Schottky rectifier suited for switch mode power supply and high frequency DC to DC converters.

Packaged either in TO-220AB, TO-220FPAB, I<sup>2</sup>PAK, or D<sup>2</sup>PAK, this device is especially intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



**Table 1. Device summary**

Symbol	Value
$I_{F(AV)}$	2 x 10 A
$V_{RRM}$	45 V
$T_{j(max)}$	175 °C
$V_{F(typ)}$	0.57 V

# 1 Characteristics

**Table 2. Absolute ratings (limiting values, per diode)**

Symbol	Parameter			Value	Unit	
$V_{RRM}$	Repetitive peak reverse voltage			45	V	
$I_{F(RMS)}$	Forward rms current			30	A	
$I_{F(AV)}$	Average forward current $\delta = 0.5$	TO-220AB D <sup>2</sup> PAK I <sup>2</sup> PAK	$T_c = 155\text{ °C}$	Per diode	10	A
		TO-220FPAB	$T_c = 125\text{ °C}$	Per device	20	
$I_{FSM}$	Surge non repetitive forward current		$t_p = 10\text{ ms}$ sinusoidal		180	A
$P_{ARM}$	Repetitive peak avalanche power		$t_p = 1\text{ }\mu\text{s}$ $T_j = 25\text{ °C}$		4000	W
$T_{stg}$	Storage temperature range			-65 to + 175	°C	
$T_j$	Maximum operating junction temperature <sup>(1)</sup>			175	°C	

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

**Table 3. Thermal resistances parameters**

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

When the diodes 1 and 2 are used simultaneously :

$$T_j(\text{diode } 1) = P(\text{diode } 1) \times R_{th(j-c)}(\text{per diode}) + P(\text{diode } 2) \times R_{th(c)}$$

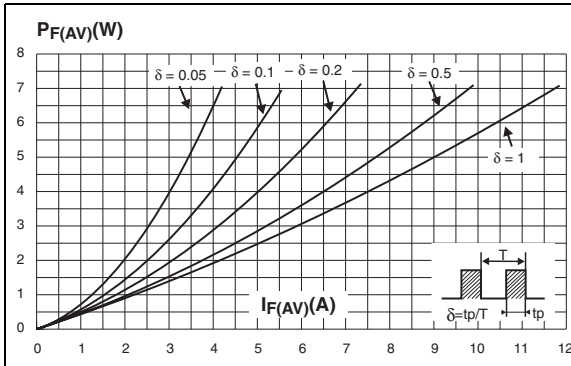
**Table 4. Static electrical characteristics (per diode)**

Symbol	Test conditions			Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$			100	$\mu\text{A}$
		$T_j = 125\text{ °C}$			7	15	mA
$V_F^{(1)}$	Forward voltage drop	$T_j = 125\text{ °C}$	$I_F = 10\text{ A}$		0.5	0.57	V
		$T_j = 25\text{ °C}$	$I_F = 20\text{ A}$			0.84	
		$T_j = 125\text{ °C}$			0.65	0.72	

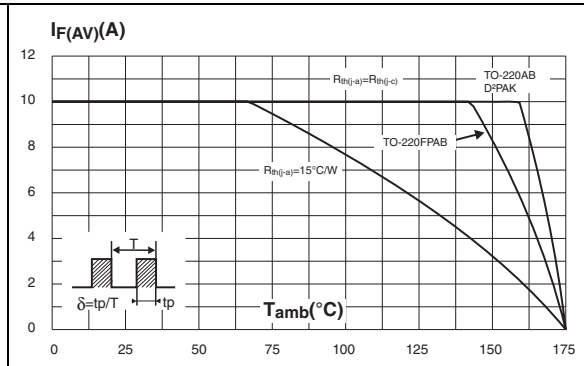
1. Pulse test :  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

To evaluate the conduction losses use the following equation :  $P = 0.42 \times I_{F(AV)} + 0.015 I_{F(RMS)}^2$

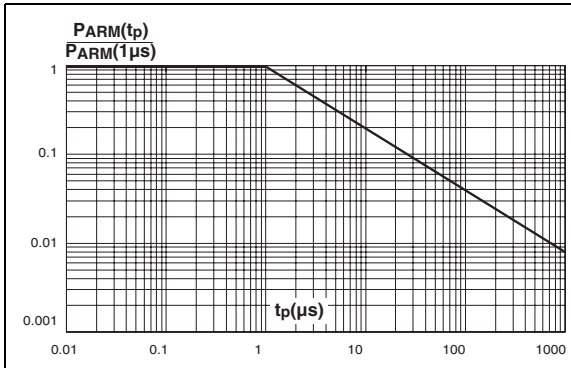
**Figure 1. Average forward power dissipation vs average forward current (per diode)**



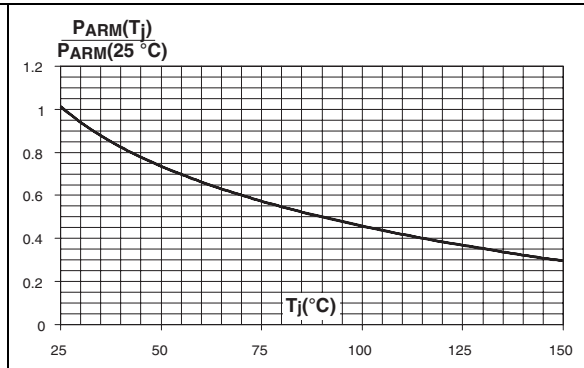
**Figure 2. Average forward current vs ambient temperature ( $\delta = 0.5$ , per diode)**



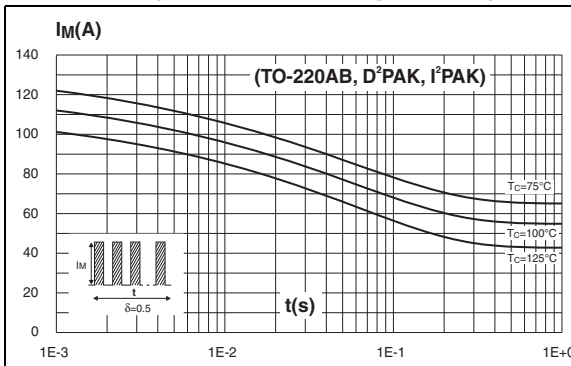
**Figure 3. Normalized avalanche power derating vs pulse duration**



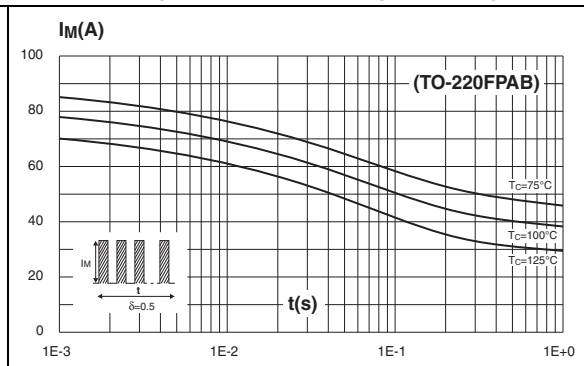
**Figure 4. Normalized avalanche power derating vs junction temperature**



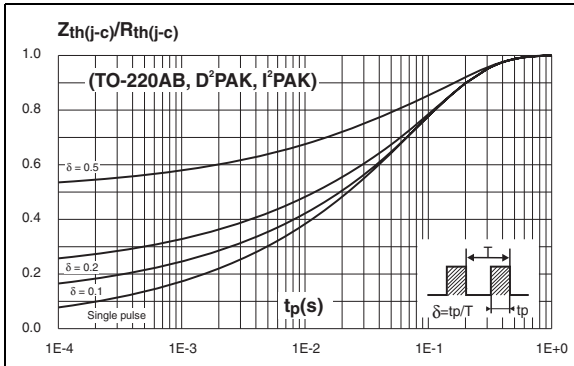
**Figure 5. Non repetitive surge peak forward current vs overload duration (maximum values, per diode)**



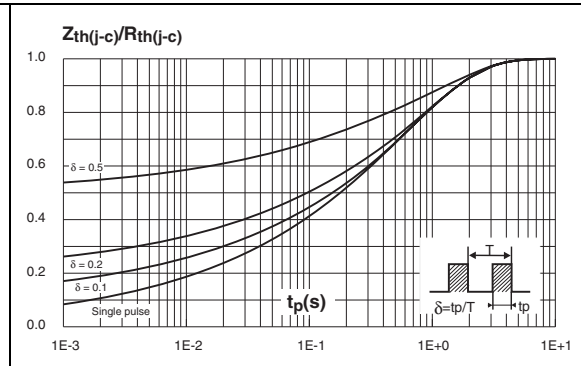
**Figure 6. Non repetitive surge peak forward current vs overload duration (maximum values, per diode)**



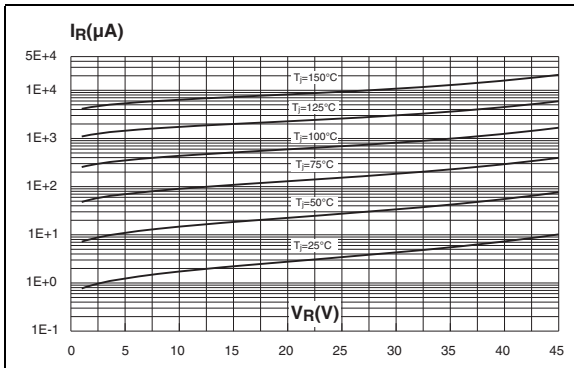
**Figure 7. Relative variation of thermal impedance junction to ambient vs pulse duration**



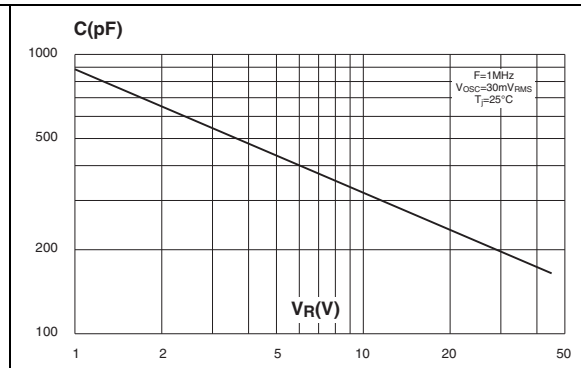
**Figure 8. Relative variation of thermal impedance junction to ambient vs pulse duration (TO-220FPAB)**



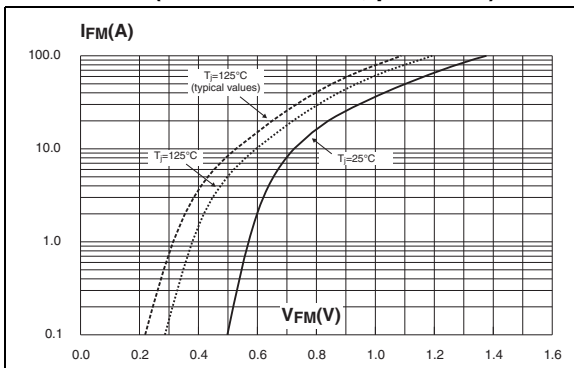
**Figure 9. Reverse leakage current vs reverse voltage applied (typical values, per diode)**



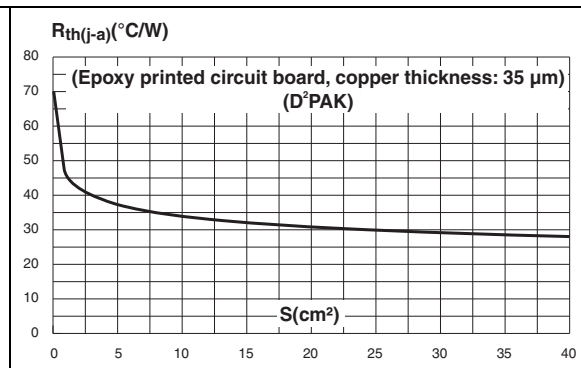
**Figure 10. Junction capacitance vs reverse voltage applied (typical values, per diode)**



**Figure 11. Forward voltage drop vs forward current (maximum values, per diode)**



**Figure 12. Thermal resistance junction to ambient vs copper surface under tab**



## 2 Package information

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

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Table 5. D<sup>2</sup>PAK dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.49	2.69	0.098	0.106
A2	0.03	0.23	0.001	0.009
B	0.70	0.93	0.027	0.037
B2	1.14	1.70	0.045	0.067
C	0.45	0.60	0.017	0.024
C2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
E	10.00	10.40	0.393	0.409
G	4.88	5.28	0.192	0.208
L	15.00	15.85	0.590	0.624
L2	1.27	1.40	0.050	0.055
L3	1.40	1.75	0.055	0.069
M	2.40	3.20	0.094	0.126
R	0.40 typ.		0.016 typ.	
V2	0°	8°	0°	8°

Figure 13. Footprint (dimensions in mm)

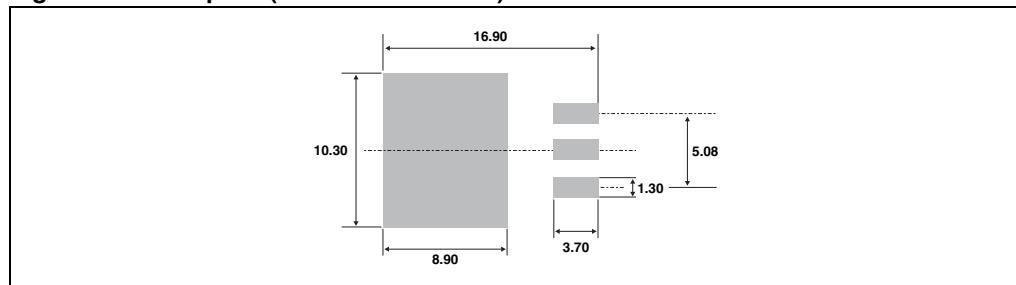
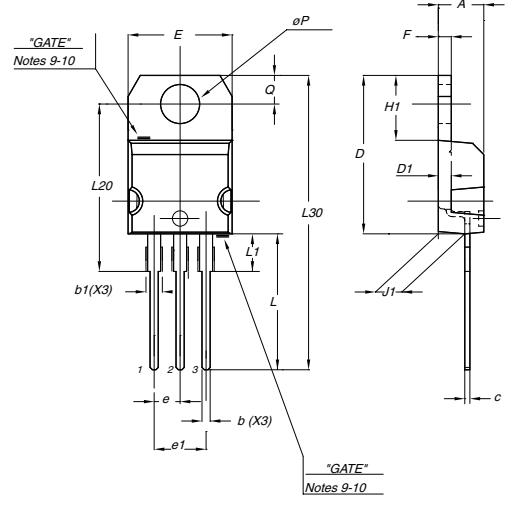
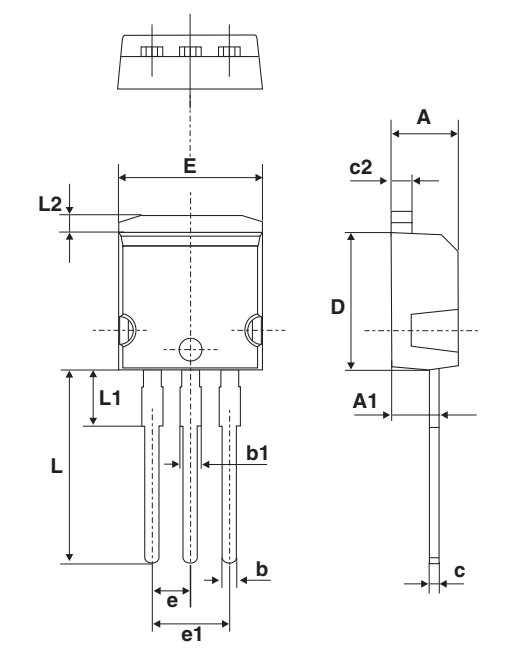


Table 6. TO-220AB dimensions



The technical drawing shows a TO-220AB package with the following dimensions labeled: A (total height), b (lead width), b1 (lead thickness), c (lead length), D (lead diameter), D1 (lead diameter at base), E (package width), F (lead length from top), H1 (lead length from top), J1 (lead length from base), L (lead length), L1 (lead length from base), L20 (lead length from top), L30 (lead length from top), e (lead pitch), e1 (lead pitch at base), øP (package diameter), and Q (package diameter at base). Dimensions are given in millimeters and inches. Notes 9-10 refer to the 'GATE' feature.

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.17	0.18
b	0.61	0.88	0.024	0.035
b1	1.14	1.70	0.045	0.067
c	0.48	0.70	0.019	0.027
D	15.25	15.75	0.60	0.62
D1	1.27 typ.		0.05 typ.	
E	10	10.40	0.39	0.41
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.19	0.20
F	1.23	1.32	0.048	0.052
H1	6.20	6.60	0.24	0.26
J1	2.40	2.72	0.094	0.107
L	13	14	0.51	0.55
L1	3.50	3.93	0.137	0.154
L20	16.40 typ.		0.64 typ.	
L30	28.90 typ.		1.13 typ.	
øP	3.75	3.85	0.147	0.151
Q	2.65	2.95	0.104	0.116

Table 7. I<sup>2</sup>PAK 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 8. 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



### 3 Ordering information

Table 9. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS2045CT	STPS2045CT	TO-220AB	2.23 g	50	Tube
STPS2045CR	STPS2045CR	I <sup>2</sup> PAK	1.49 g	50	Tube
STPS2045CFP	STPS2045CFP	TO-220FPAB	2.0 g	50	Tube
STPS2045CG	STPS2045CG	D <sup>2</sup> PAK	1.48 g	50	Tube
STPS2045CG-TR	STPS2045CG			1000	Tape and reel

### 4 Revision history

Table 10. Document revision history

Date	Revision	Changes
05-Oct-2004	4F	Last update
01-Dec-2004	5	Figure 16 (I <sup>2</sup> PAK Package Mechanical Data): references b1 and b2 changed from 1.17mm to 1.70mm.
05-Feb-2010	6	Updated <a href="#">Table 2</a> (removed voltage). Updated ECOPACK statement. Updated <a href="#">Table 6.: TO-220AB dimensions</a> .

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