STPS2045C

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^2PAK, or D^2PAK, this device is especially intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.

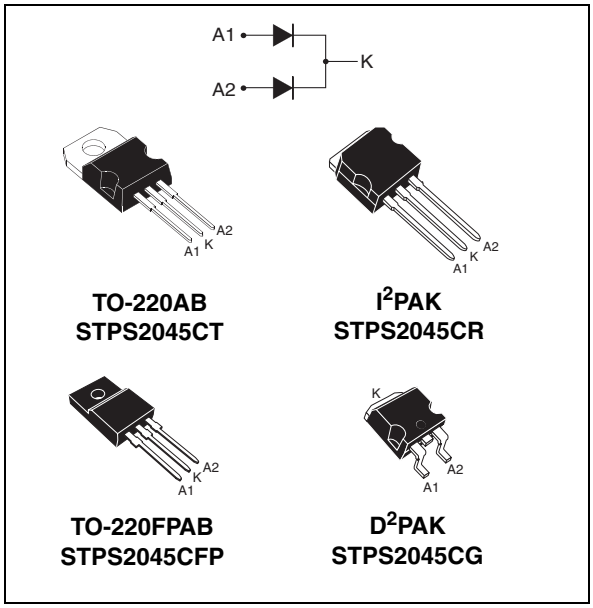


Table 1. Device summary

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^2PAK I^2PAK	T_c = 155 °C	Per diode	10	A
		TO-220FPAB	T_c = 125 °C	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 = 1 µs T_j = 25 °C		4000	W
T_{stg}	Storage temperature range				-65 to + 175	°C
T_j	Maximum operating junction temperature(1)				175	°C

1. $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ 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^2PAK / I^2PAK	Per diode Total	2.2 1.3	°C/W
		TO-220FPAB	Per diode Total	4.5 3.5	
$R_{th(c)}$	Coupling	TO-220AB / D^2PAK / I^2PAK	Coupling	0.3	°C/W
		TO-220FPAB		2.5	

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

Table 4. Static electrical characteristics (per diode)

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

1. Pulse test : t_p = 380 µs, δ < 2%

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

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

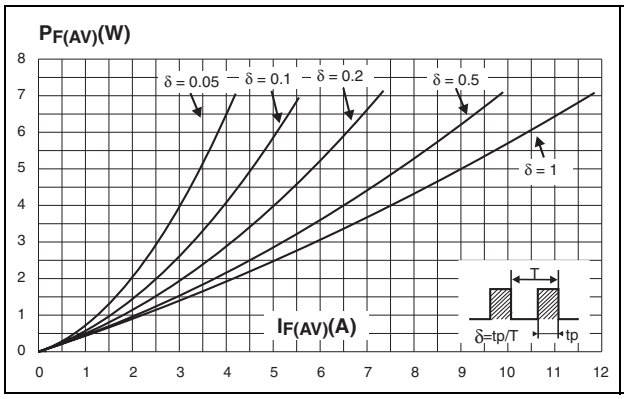


Figure 2. Average forward current vs ambient temperature (δ = 0.5, per diode)

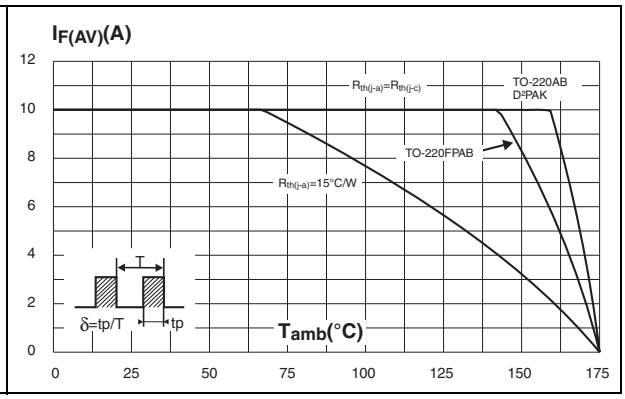


Figure 3. Normalized avalanche power derating vs pulse duration

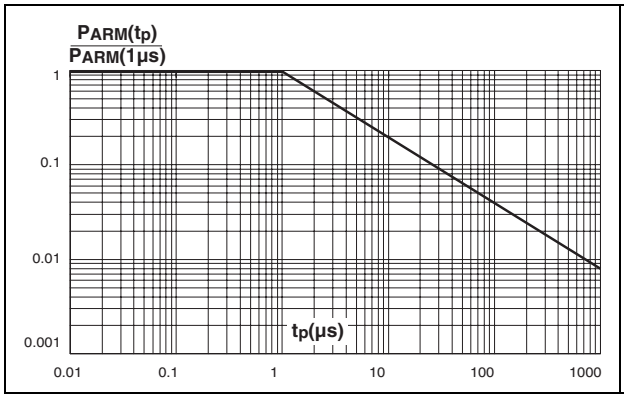


Figure 4. Normalized avalanche power derating vs junction temperature

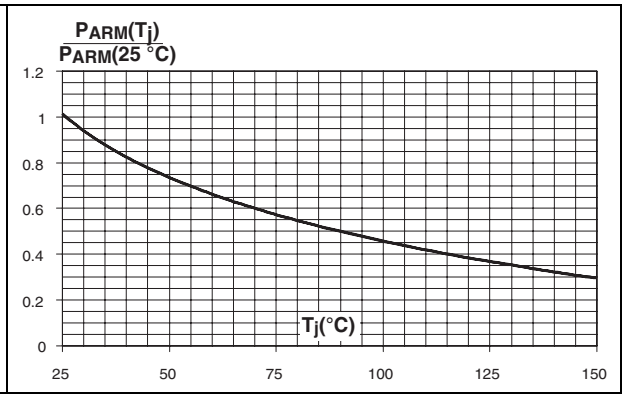


Figure 5. Non repetitive surge peak forward current vs overload duration (maximum values, per diode)

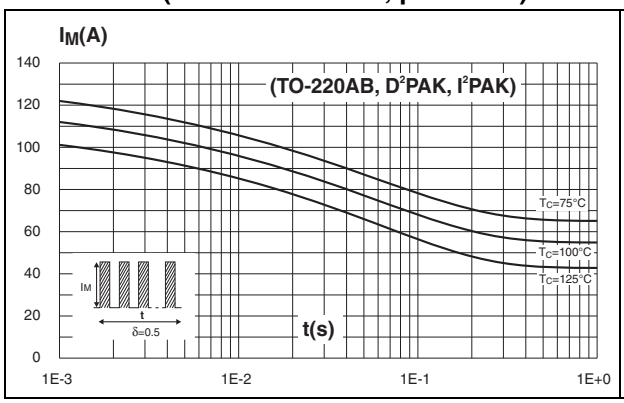


Figure 6. Non repetitive surge peak forward current vs overload duration (maximum values, per diode)

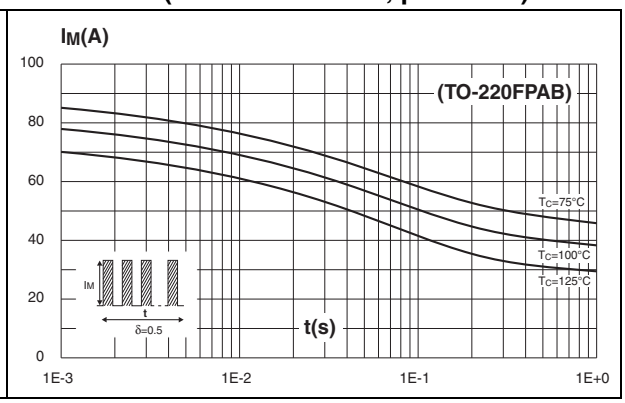


Figure 7. Relative variation of thermal impedance junction to ambient vs pulse duration

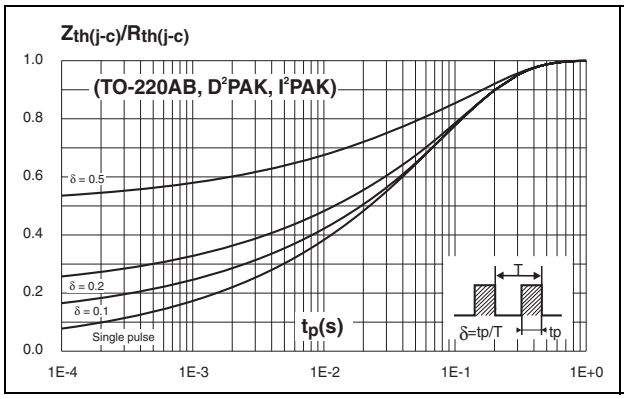


Figure 8. Relative variation of thermal impedance junction to ambient vs pulse duration (TO-220FPAB)

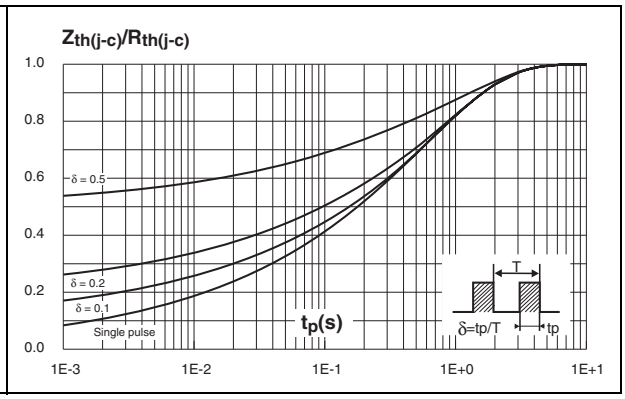


Figure 9. Reverse leakage current vs reverse voltage applied (typical values, per diode)

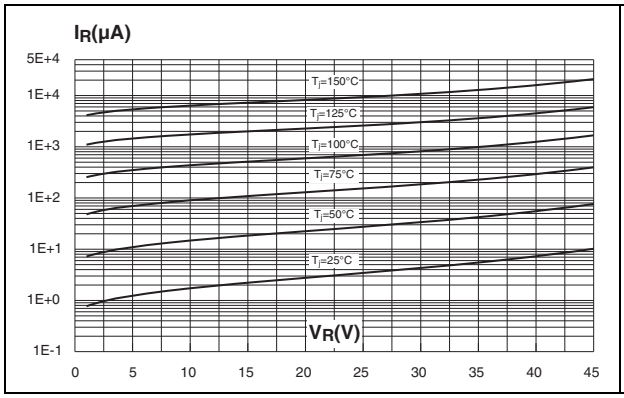


Figure 10. Junction capacitance vs reverse voltage applied (typical values, per diode)

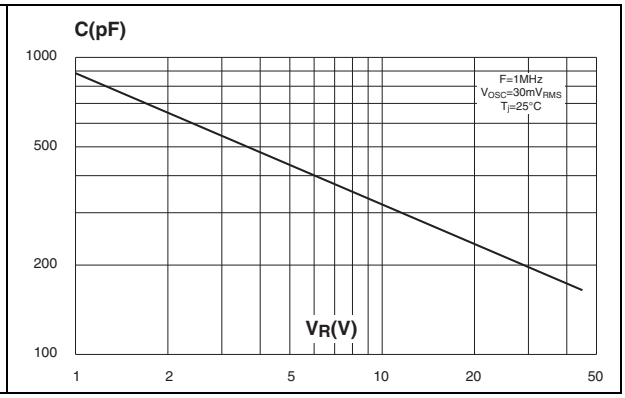


Figure 11. Forward voltage drop vs forward current (maximum values, per diode)

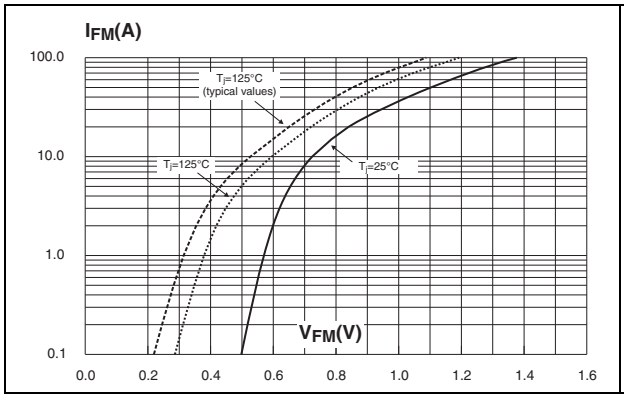
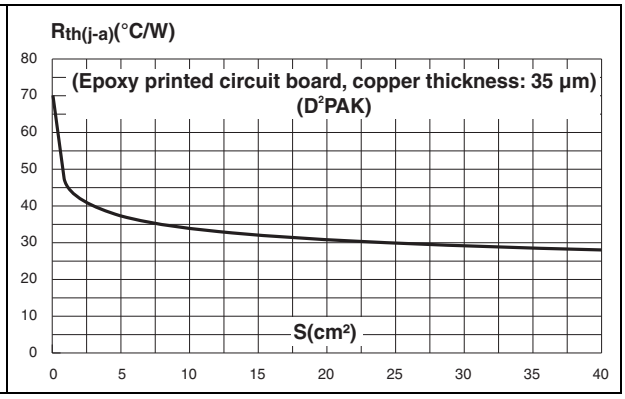


Figure 12. Thermal resistance junction to ambient vs copper surface under tab



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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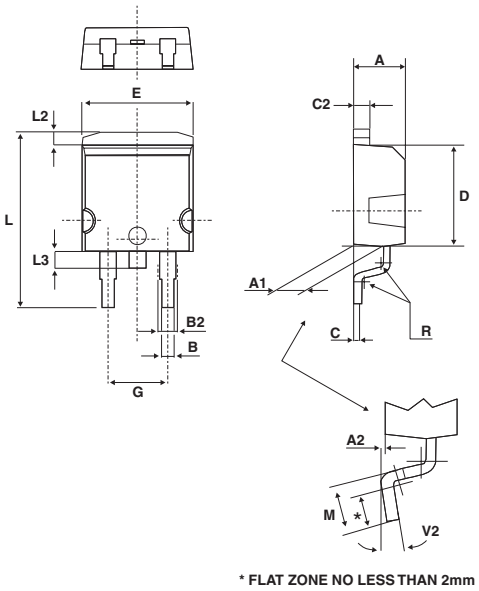
Table 5. D²PAK dimensions



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)

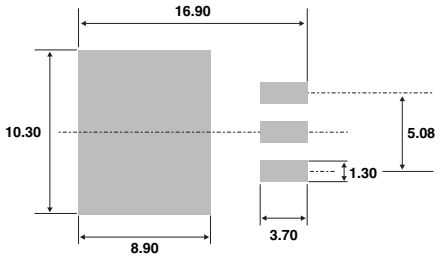
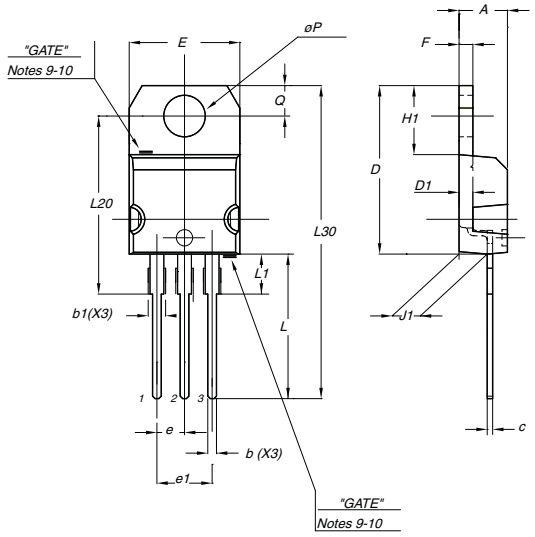
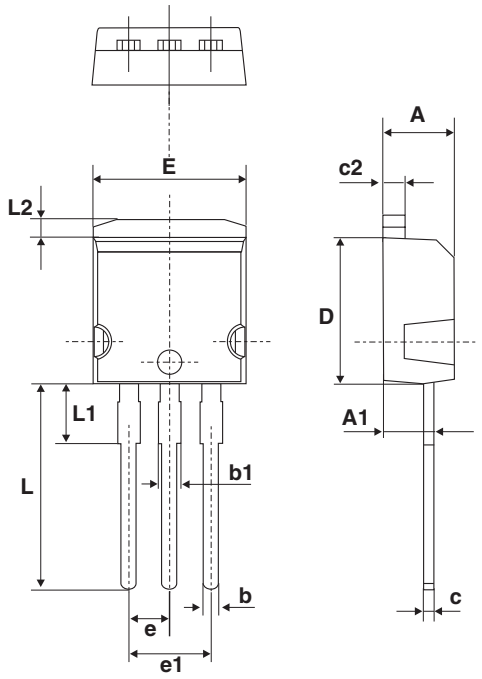


Table 6. TO-220AB dimensions



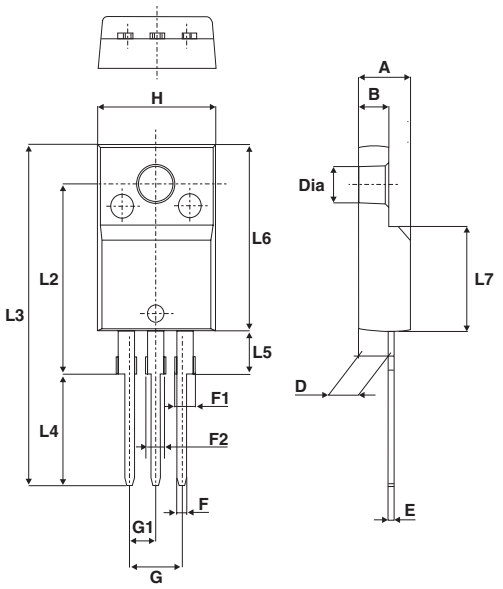
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.17	0.18
b	0.61	0.88	0.024	0.035
b1	1.14	1.70	0.045	0.067
c	0.48	0.70	0.019	0.027
D	15.25	15.75	0.60	0.62
D1	1.27 typ.		0.05 typ.	
E	10	10.40	0.39	0.41
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.19	0.20
F	1.23	1.32	0.048	0.052
H1	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^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 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^2PAK	1.49 g	50	Tube
STPS2045CFP	STPS2045CFP	TO-220FPAB	2.0 g	50	Tube
STPS2045CG	STPS2045CG	D^2PAK	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^2PAK Package Mechanical Data): references b1 and b2 changed from 1.17mm to 1.70mm.
05-Feb-2010	6	Updated *Table 2* (removed voltage). Updated ECOPACK statement. Updated *Table 6.: TO-220AB dimensions*.

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