STPS2045C

POWER SCHOTTKY RECTIFIER

Table 1: Main Product Characteristics

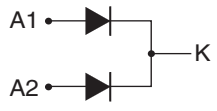
$I_{F(AV)}$	2 x 10 A
V_{RRM}	45 V
T_j (max)	175°C
V_F (typ)	0.57 V

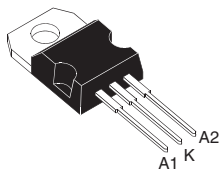
FEATURES AND BENEFITS

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

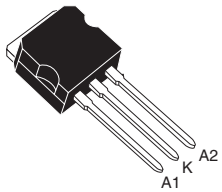
DESCRIPTION

Dual center tap Schottky rectifier suited for SwitchMode 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.

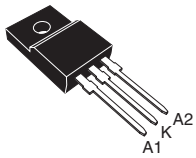




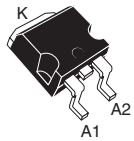
TO-220AB
STPS2045CT



I^2PAK
STPS2045CR



TO-220FPAB
STPS2045CFP



D^2PAK
STPS2045CG

Table 2: Order Codes

Part Number	Marking
STPS2045CT	STPS2045CT
STPS2045CFP	STPS2045CFP
STPS2045CG	STPS2045CG
STPS2045CG-TR	STPS2045CG
STPS2045CR	STPS2045CR

Table 3: Absolute Ratings (limiting values, per diode)

Symbol	Parameter				Value	Unit
V_{RRM}	Repetitive peak reverse voltage				45	V
$I_{F(RMS)}$	RMS forward voltage				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		tp = 10ms sinusoidal		180	A
I_{RRM}	Repetitive peak reverse current		tp = 2µs F = 1kHz square		1	A
I_{RSM}	Non repetitive peak reverse current		tp = 100ms square		2	A
P_{ARM}	Repetitive peak avalanche power		tp = 1µs Tj = 25°C		4000	W
T_{stg}	Storage temperature range				-65 to + 175	°C
T_j	Maximum operating junction temperature *				175	°C
dV/dt	Critical rate of rise of reverse voltage				10000	V/µs

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

Table 4: Thermal Resistance 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 5: Static Electrical Characteristics (per diode)

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

Pulse test: * tp = 380 µs, $\delta < 2\%$

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

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

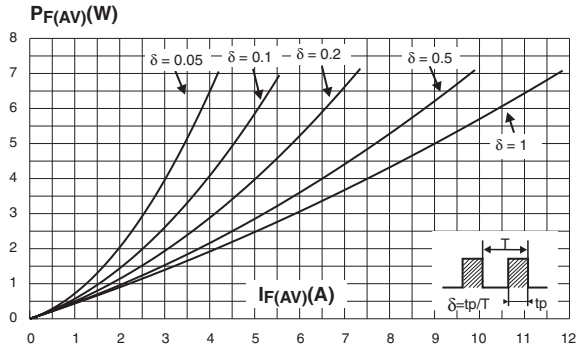


Figure 2: Average forward current versus ambient temperature (δ = 0.5, per diode)

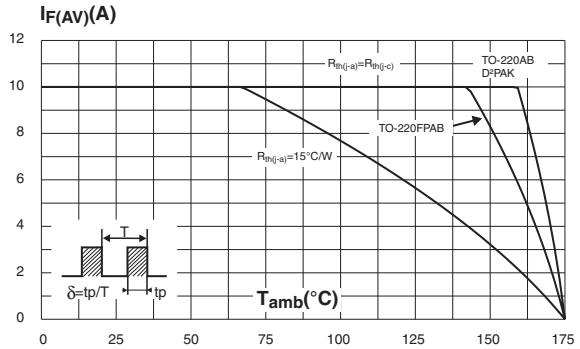


Figure 3: Normalized avalanche power derating versus pulse duration

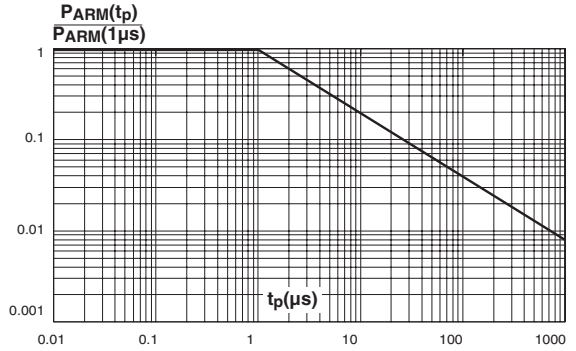


Figure 4: Normalized avalanche power derating versus junction temperature

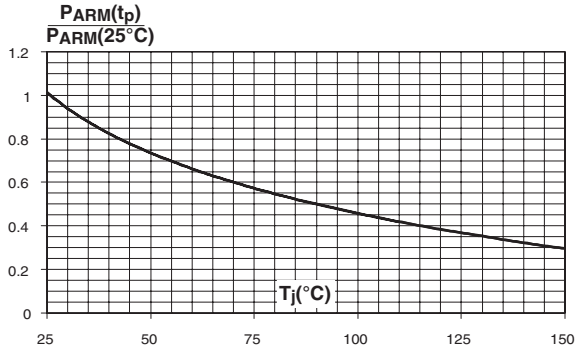


Figure 5: Non repetitive surge peak forward current versus overload duration (maximum values, per diode) (TO-220AB, D²PAK, I²PAK)

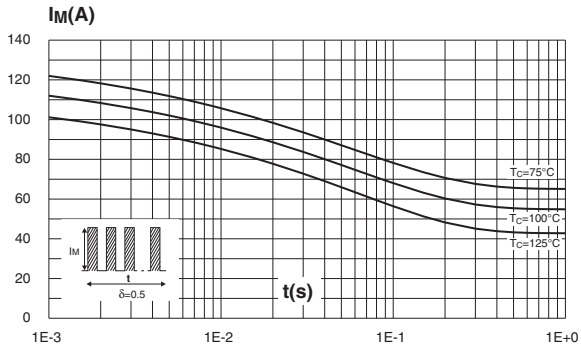


Figure 6: Non repetitive surge peak forward current versus overload duration (maximum values, per diode) (TO-220FPAB)

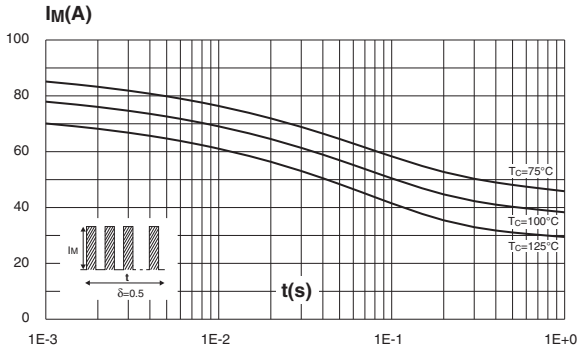


Figure 7: Relative variation of thermal impedance junction to ambient versus pulse duration (TO-220AB, D^2PAK, I^2PAK)

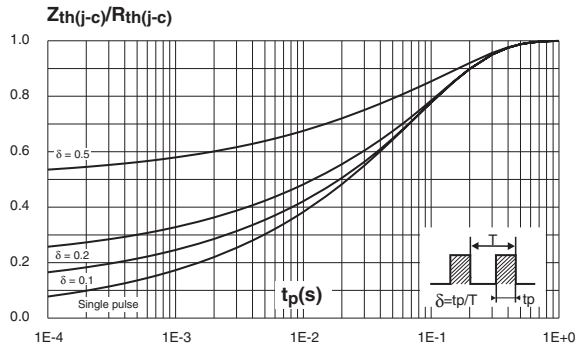


Figure 8: Relative variation of thermal impedance junction to ambient versus pulse duration (TO-220FPAB)

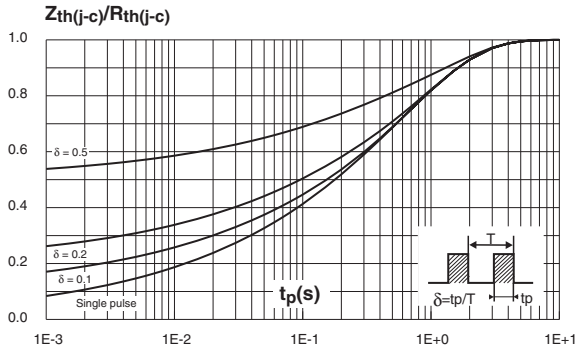


Figure 9: Reverse leakage current versus reverse voltage applied (typical values, per diode)

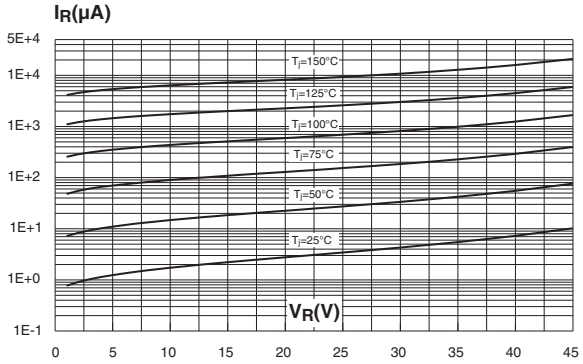


Figure 10: Junction capacitance versus reverse voltage applied (typical values, per diode)

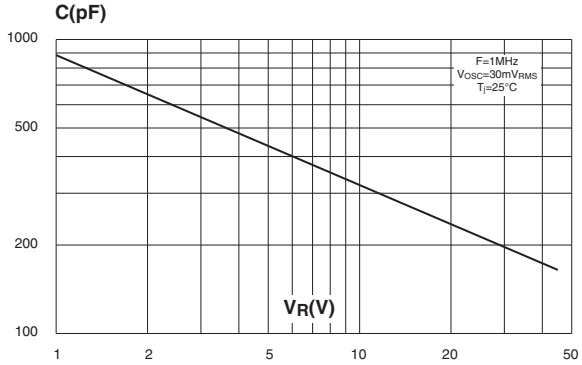


Figure 11: Forward voltage drop versus forward current (maximum values, per diode)

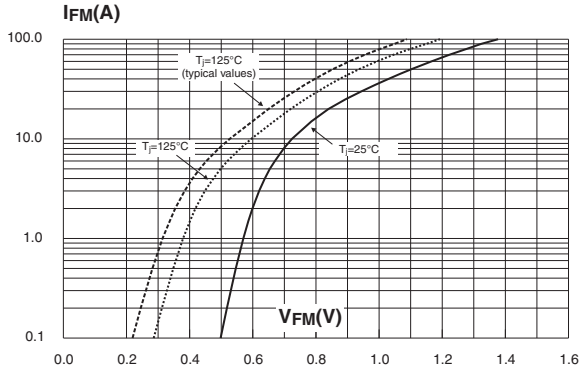


Figure 12: Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board, copper thickness: 35µm) (D^2PAK)

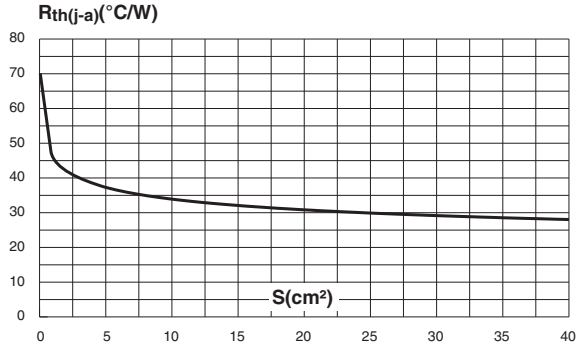
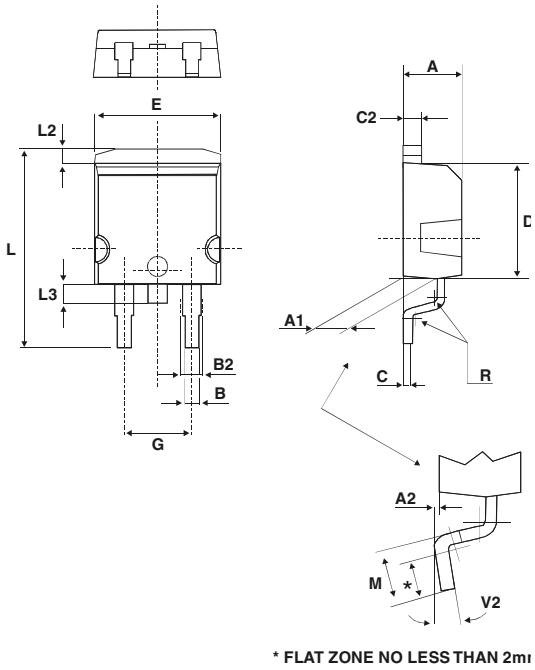


Figure 13: D^{2}PAK Package Mechanical Data



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 14: Foot Print Dimensions (in millimeters)

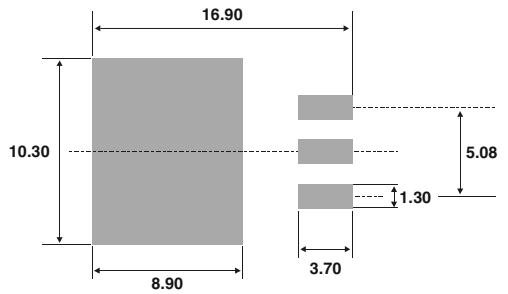
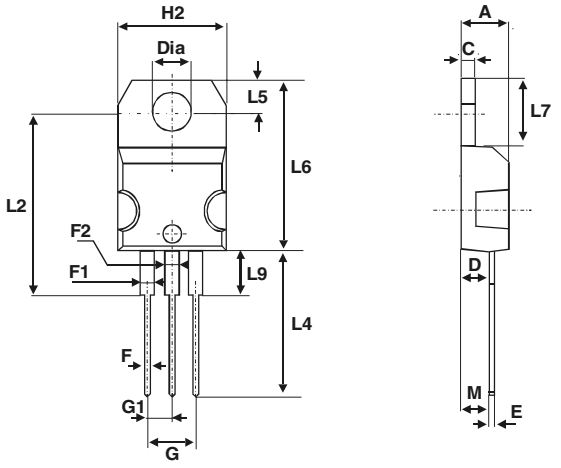
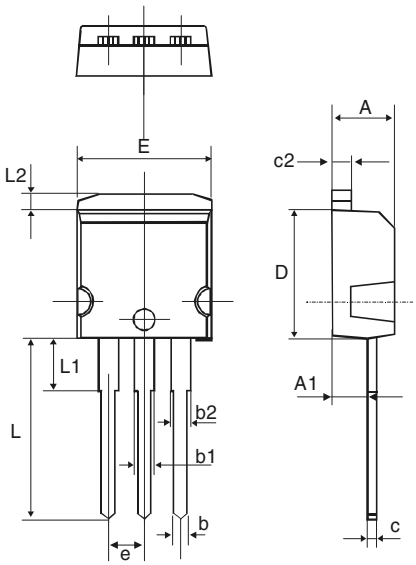


Figure 15: TO-220AB Package Mechanical Data



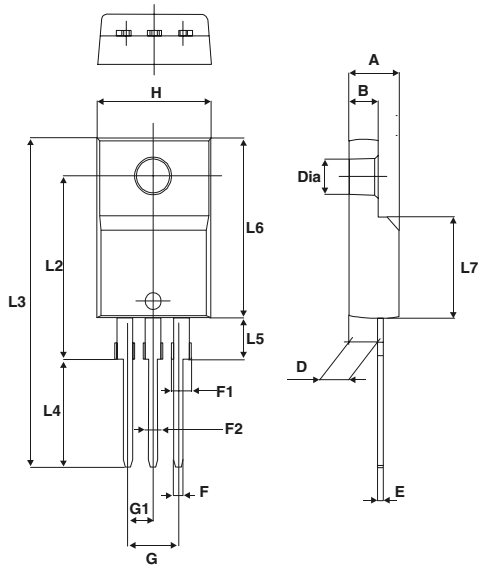
REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
F2	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
G1	2.40	2.70	0.094	0.106
H2	10	10.40	0.393	0.409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

Figure 16: I^{2}PAK Package Mechanical Data



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
b	0.70	0.93	0.028	0.037
b1	1.14	1.70	0.044	0.067
b2	1.14	1.70	0.044	0.067
c	0.45	0.60	0.018	0.024
c2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
e	2.40	2.70	0.094	0.106
E	10.0	10.4	0.394	0.409
L	13.1	13.6	0.516	0.535
L1	3.48	3.78	0.137	0.149
L2	1.27	1.40	0.050	0.055

Figure 17: TO-220FPAB Package Mechanical Data



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: Ordering Information

Ordering type	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 & reel

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 m.N.
- Maximum torque value: 1.0 m.N.

Table 7: Revision History

Date	Revision	Description of 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.

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