

## POWER SCHOTTKY RECTIFIER

**Table 1: Main Product Characteristics**

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

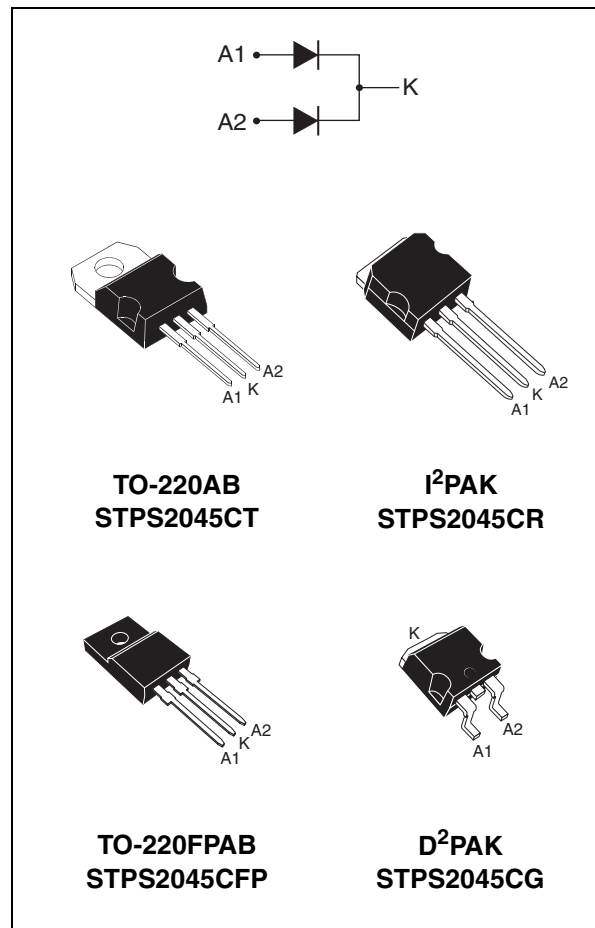
### FEATURES AND BENEFITS

- 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<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 2: Order Codes**

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

## STPS2045C

**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 <sup>2</sup> PAK / I <sup>2</sup> PAK	$T_c = 155^\circ\text{C}$	Per diode	10	A
		TO-220FPAB	$T_c = 125^\circ\text{C}$	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

\* :  $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$  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 <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
		TO-220FPAB		2.5	

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 5: Static Electrical Characteristics** (per diode)

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

Pulse test: \* tp = 380 μs, δ < 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 versus average forward current (per diode)

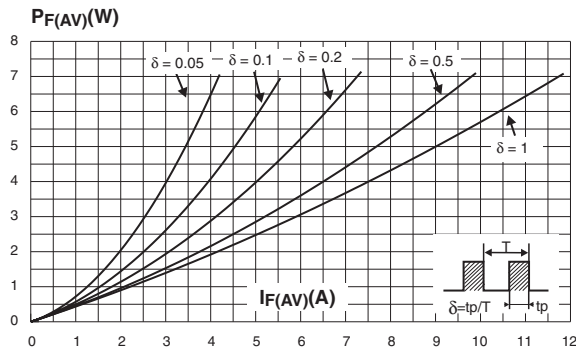


Figure 2: Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)

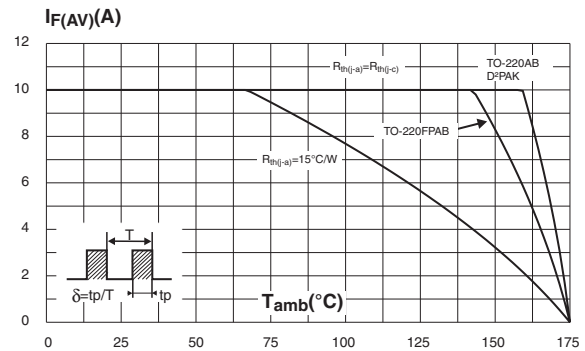


Figure 3: Normalized avalanche power derating versus pulse duration

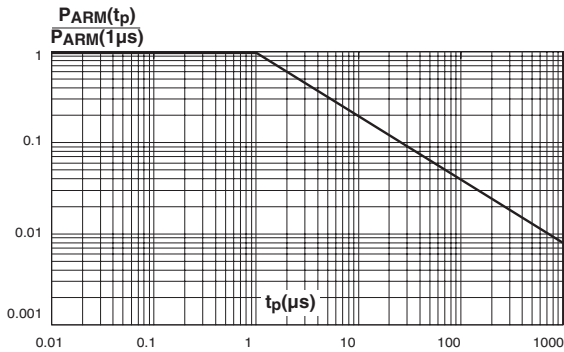


Figure 4: Normalized avalanche power derating versus junction temperature

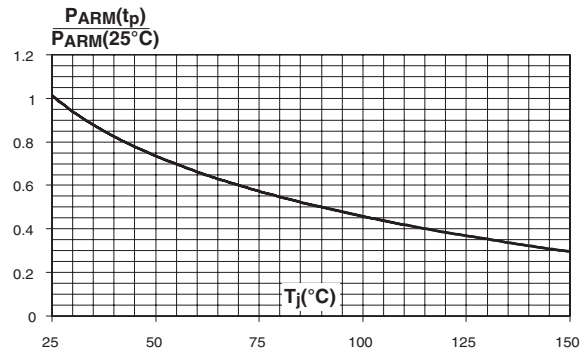


Figure 5: Non repetitive surge peak forward current versus overload duration (maximum values, per diode) (TO-220AB, D<sup>2</sup>PAK, I<sup>2</sup>PAK)

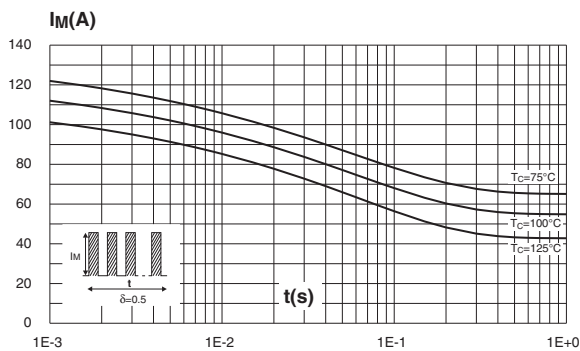
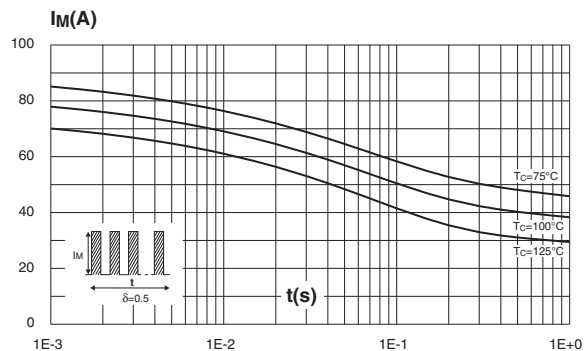
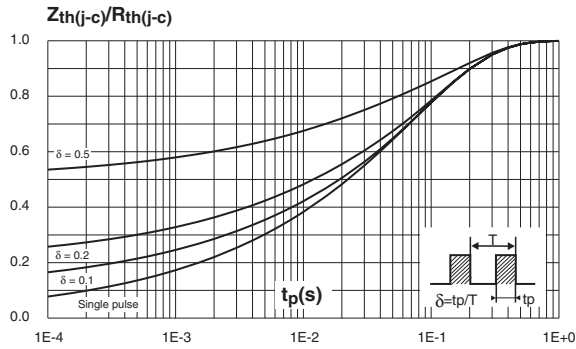


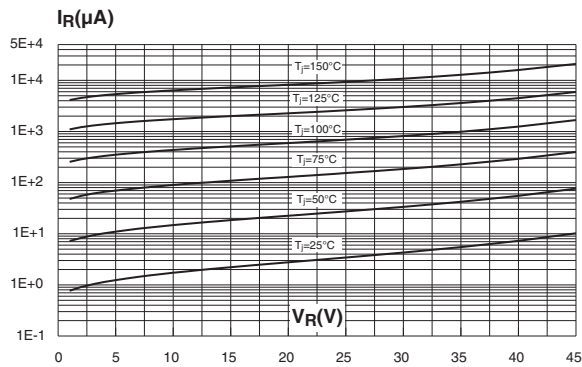
Figure 6: Non repetitive surge peak forward current versus overload duration (maximum values, per diode) (TO-220FPAB)



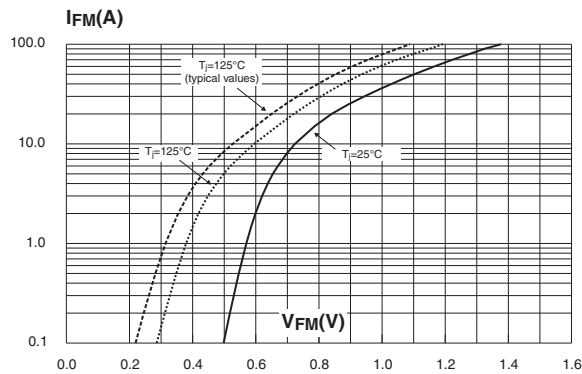
**Figure 7: Relative variation of thermal impedance junction to ambient versus pulse duration (TO-220AB, D<sup>2</sup>PAK, I<sup>2</sup>PAK)**



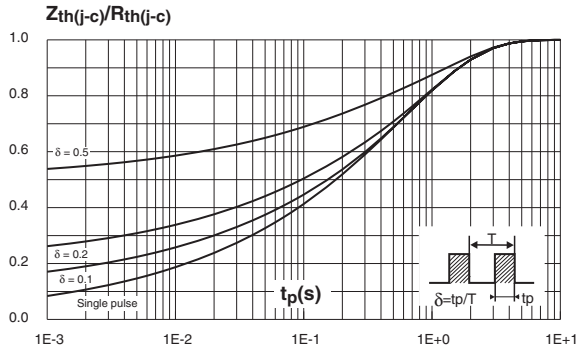
**Figure 9: Reverse leakage current versus reverse voltage applied (typical values, per diode)**



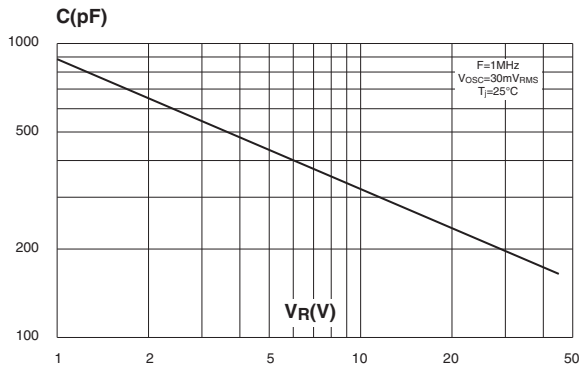
**Figure 11: Forward voltage drop versus forward current (maximum values, per diode)**



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



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



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

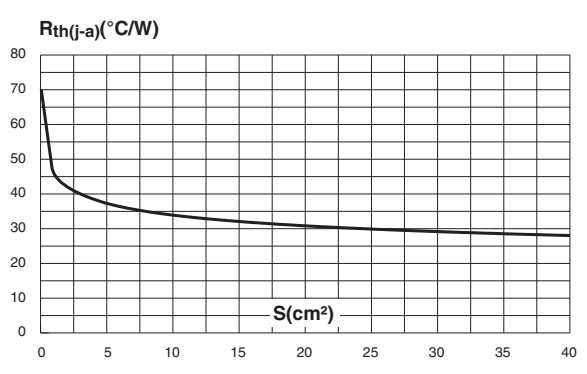


Figure 13: D<sup>2</sup>PAK Package Mechanical Data

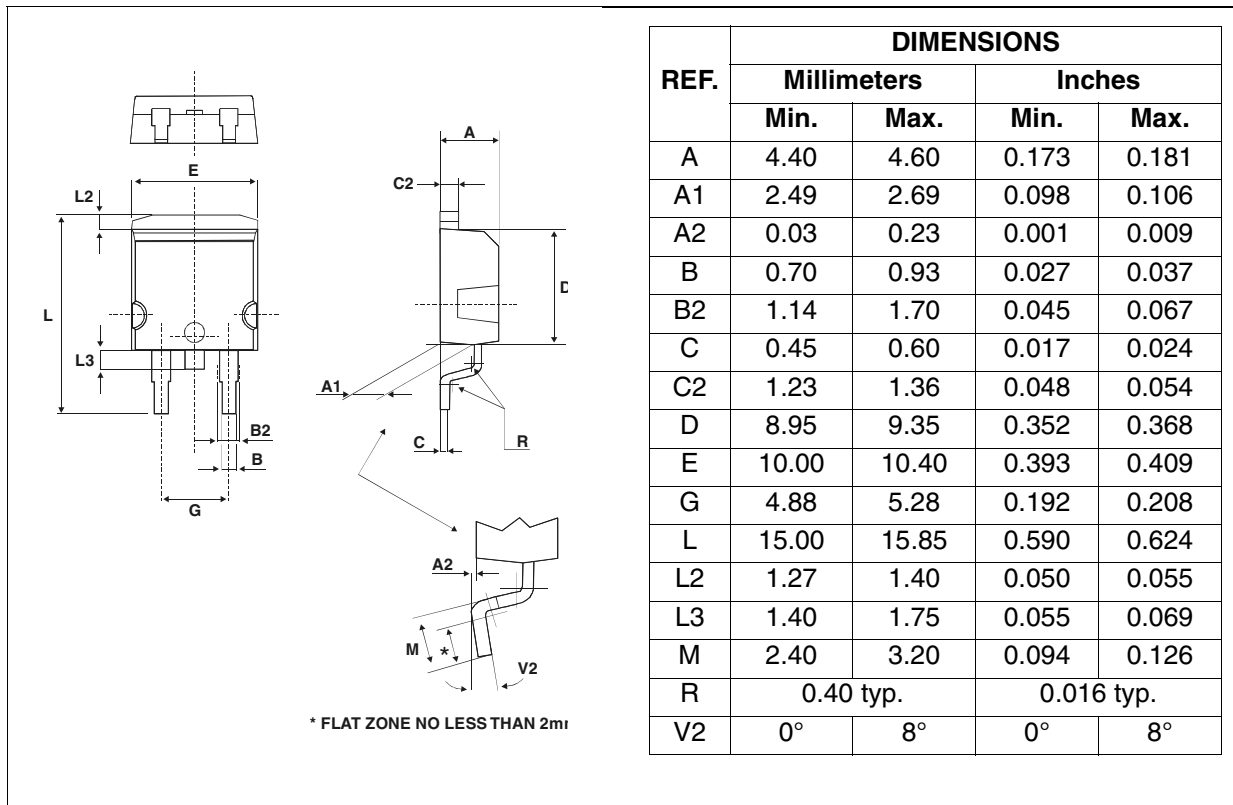


Figure 14: Foot Print Dimensions (in millimeters)

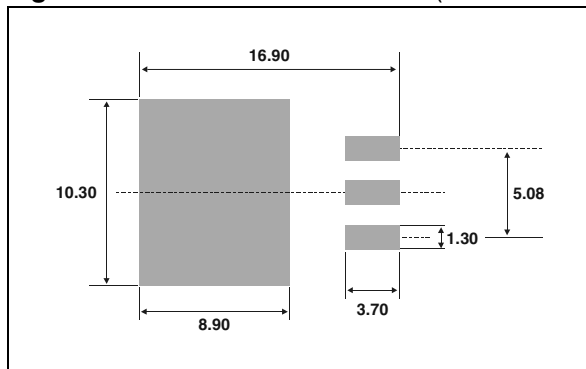


Figure 15: TO-220AB Package Mechanical Data

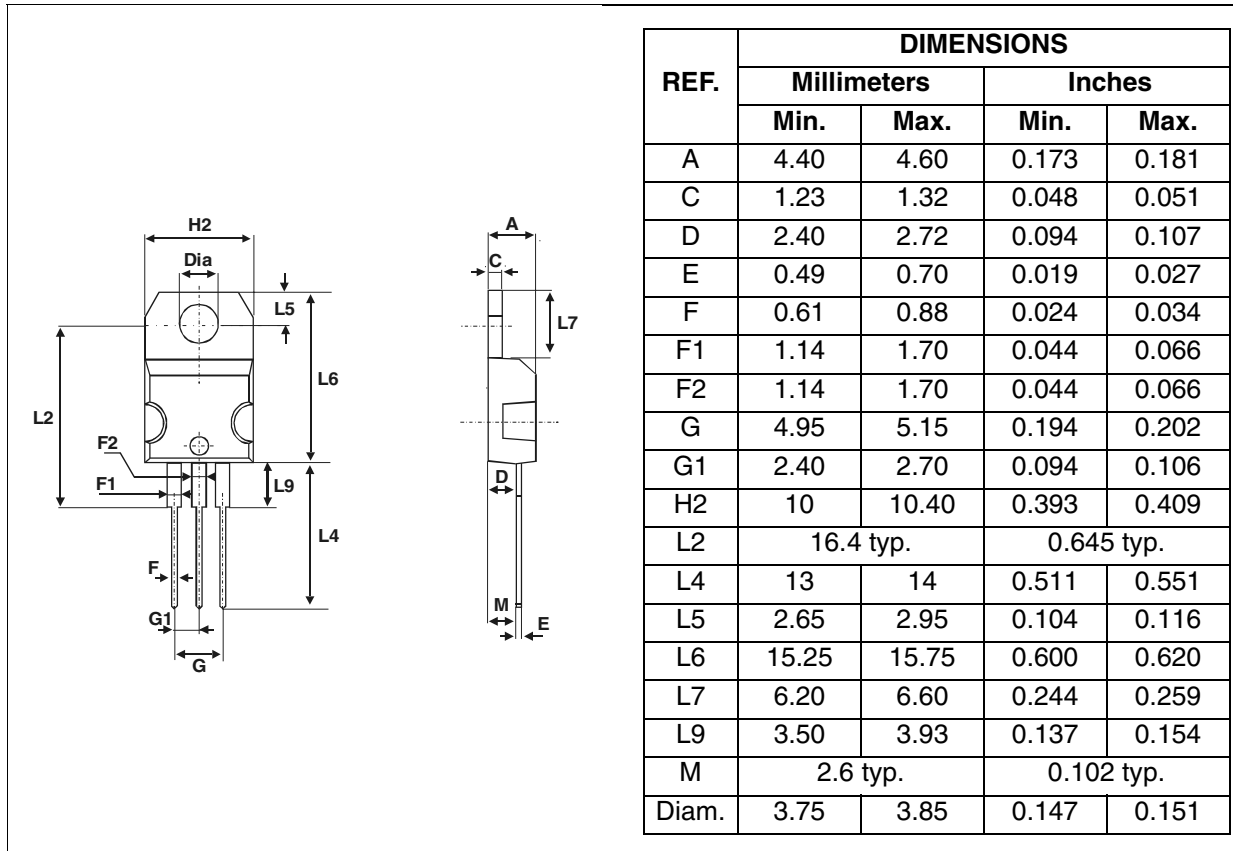


Figure 16: I<sup>2</sup>PAK Package Mechanical Data

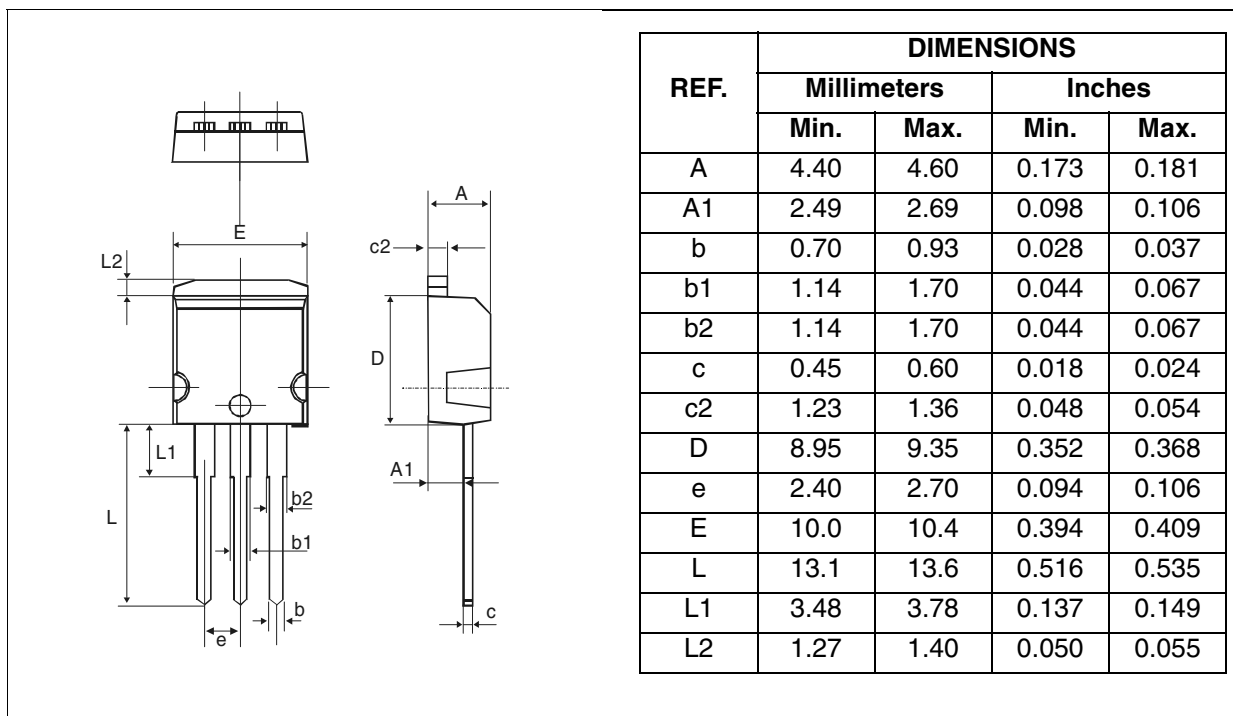


Figure 17: TO-220FPAB Package Mechanical Data

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 <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 & 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 <sup>2</sup> PAK Package Mechanical Data): references b1 and b2 changed from 1.17mm to 1.70mm.

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics.  
All other names are the property of their respective owners

© 2004 STMicroelectronics - All rights reserved

**STMicroelectronics group of companies**

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan -  
Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America  
[www.st.com](http://www.st.com)