

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, I²PAK, or D²PAK, this device is especially intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.

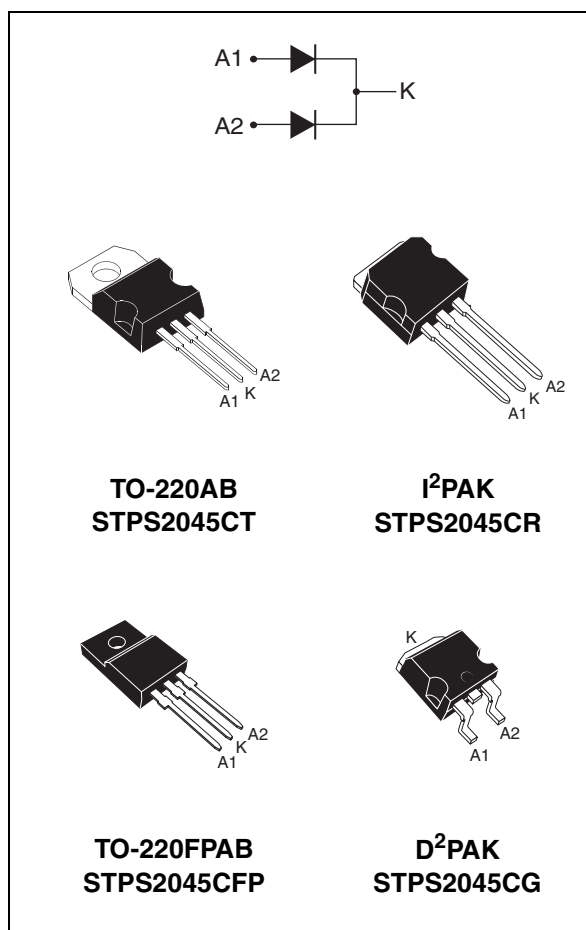


Table 2: Order Codes

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

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 δ = 0.5	TO-220AB / D ² PAK / I ² PAK	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

* : $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$ 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 ² PAK / I ² PAK	Per diode	2.2	$^\circ\text{C/W}$
			Total	1.3	
		TO-220FPAB	Per diode	4.5	
			Total	3.5	
$R_{th(c)}$	Coupling	TO-220AB / D ² PAK / I ² PAK	Coupling	0.3	$^\circ\text{C/W}$
		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: * $t_p = 380 \mu\text{s}$, $\delta < 2\%$

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 versus average forward current (per diode)

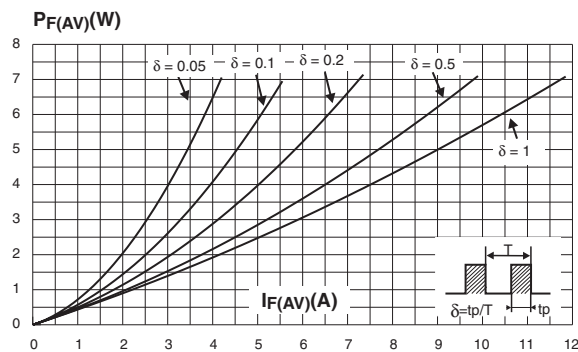


Figure 2: Average forward current versus ambient temperature ($\delta = 0.5$, per diode)

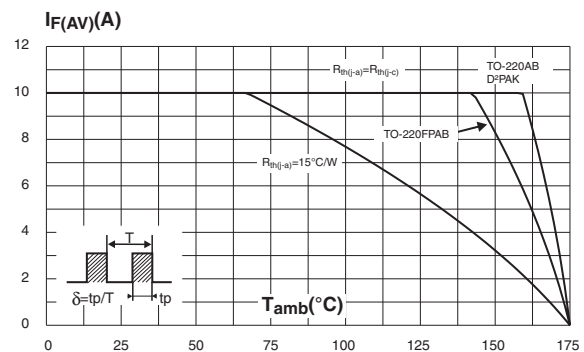


Figure 3: Normalized avalanche power derating versus pulse duration

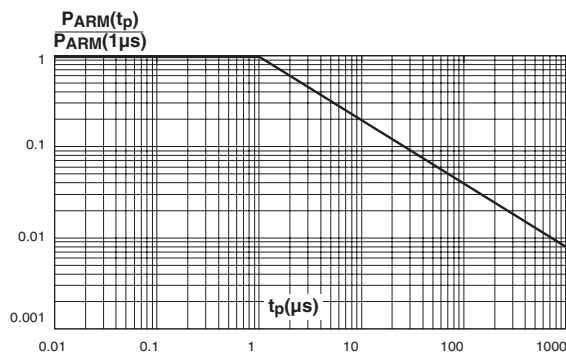


Figure 4: Normalized avalanche power derating versus junction temperature

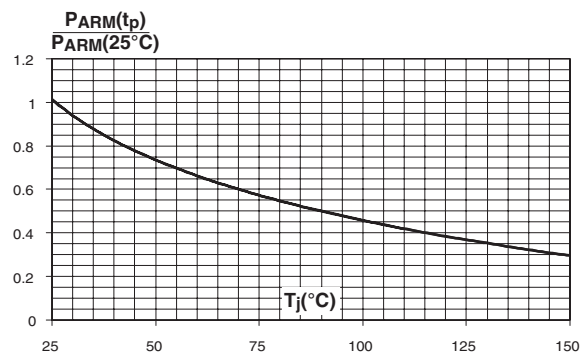


Figure 5: Non repetitive surge peak forward current versus overload duration (maximum values, per diode) (TO-220AB, D²PAK, I²PAK)

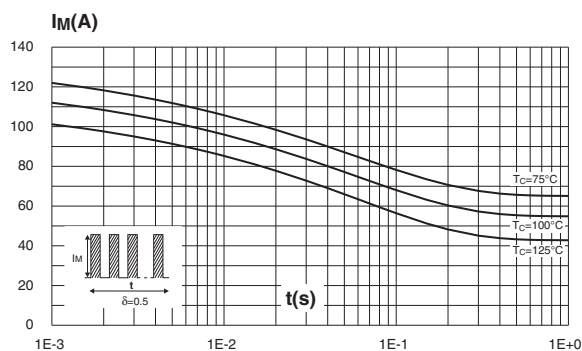


Figure 6: Non repetitive surge peak forward current versus overload duration (maximum values, per diode) (TO-220FPAB)

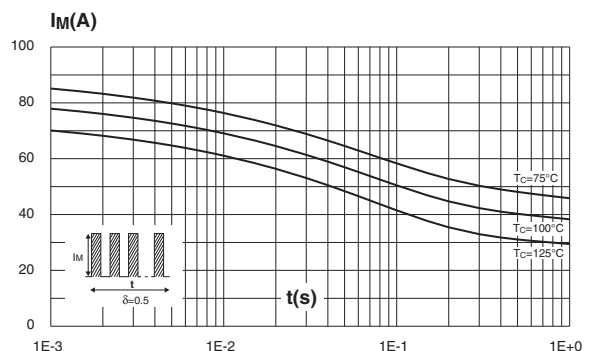


Figure 7: Relative variation of thermal impedance junction to ambient versus pulse duration (TO-220AB, D²PAK, I²PAK)

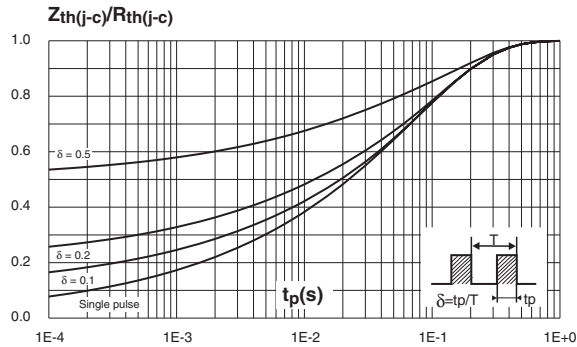


Figure 8: Relative variation of thermal impedance junction to ambient versus pulse duration (TO-220FPAB)

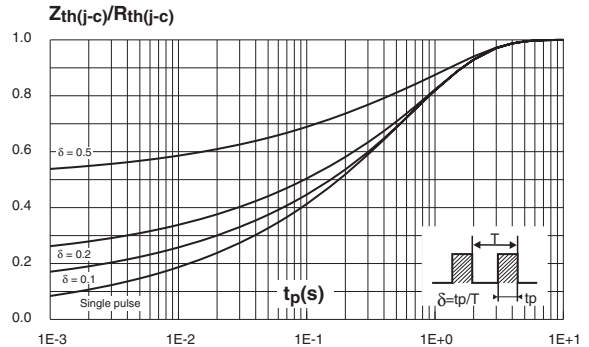


Figure 9: Reverse leakage current versus reverse voltage applied (typical values, per diode)

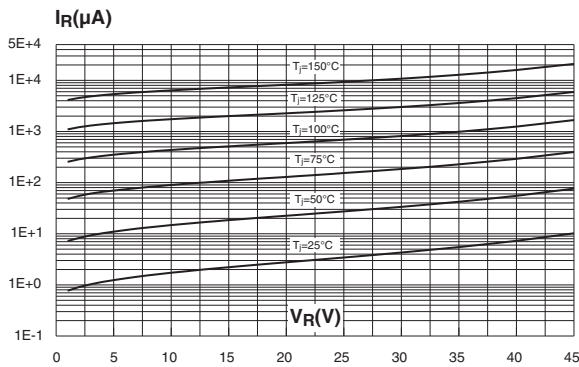


Figure 10: Junction capacitance versus reverse voltage applied (typical values, per diode)

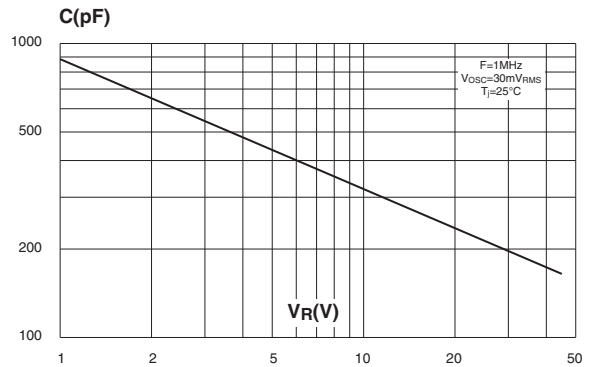


Figure 11: Forward voltage drop versus forward current (maximum values, per diode)

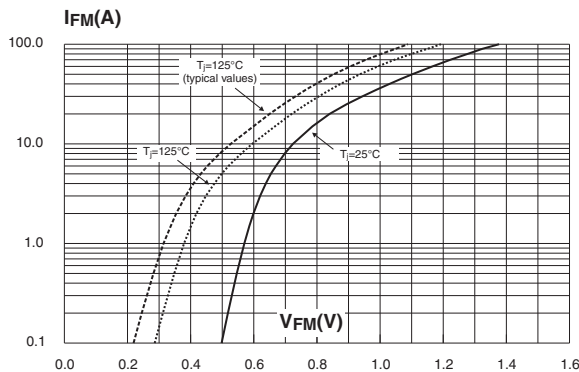


Figure 12: Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board, copper thickness: 35μm) (D²PAK)

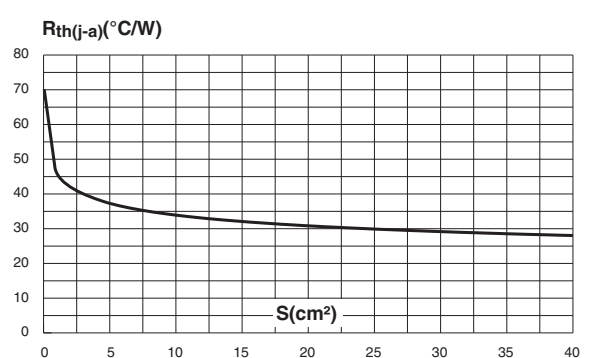


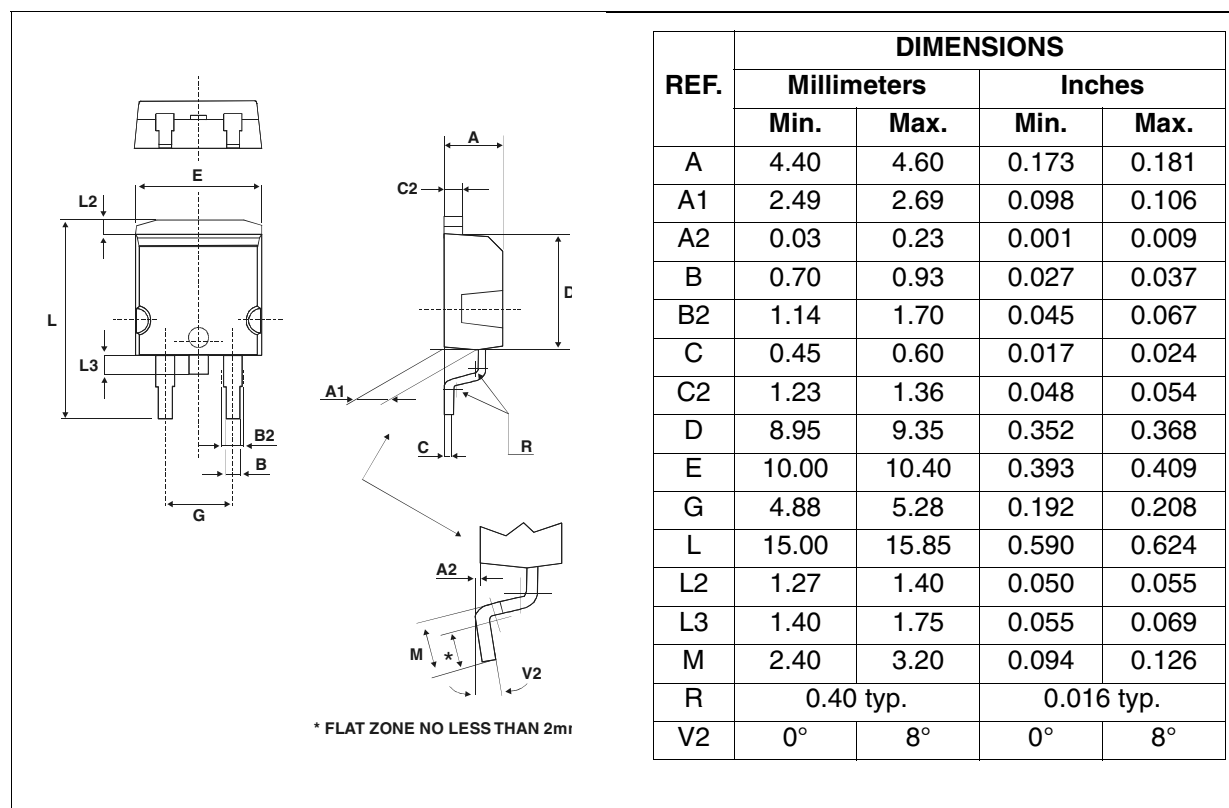
Figure 13: D²PAK Package Mechanical Data

Figure 14: Foot Print Dimensions (in millimeters)

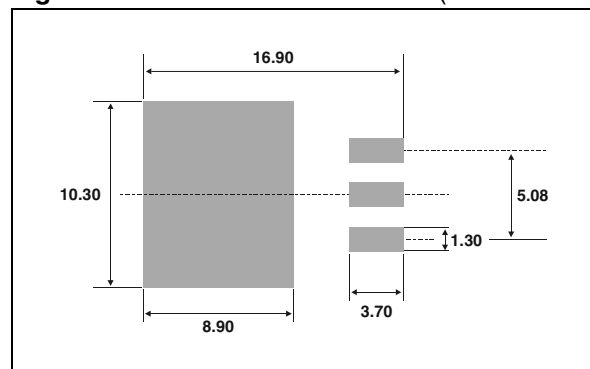


Figure 15: TO-220AB Package Mechanical Data

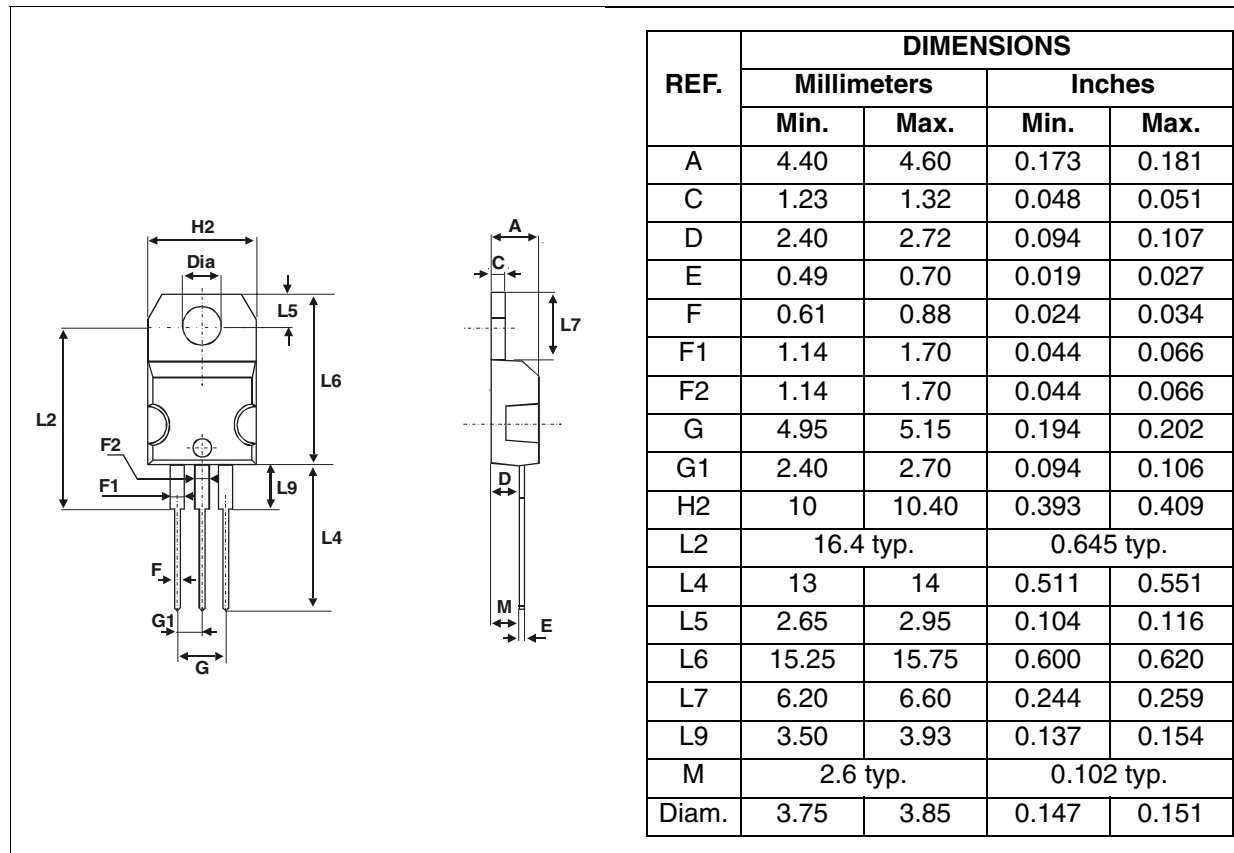
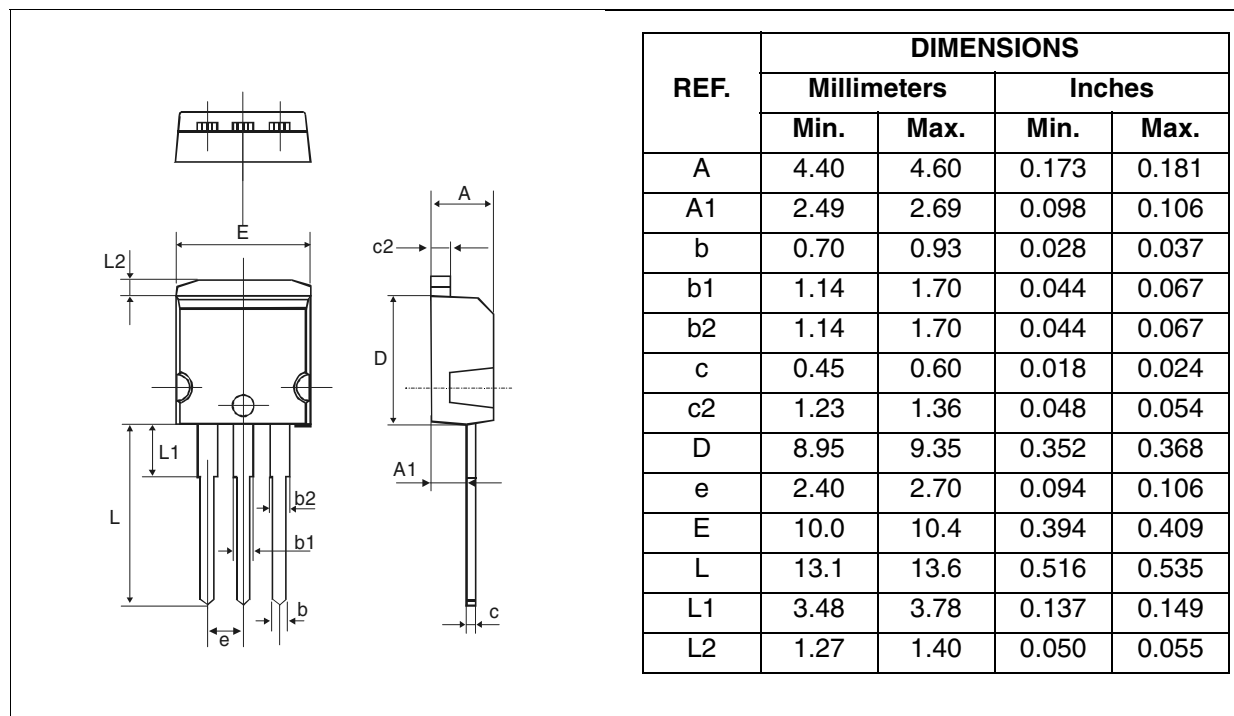
Figure 16: I²PAK Package Mechanical Data

Figure 17: TO-220FPAB Package Mechanical Data

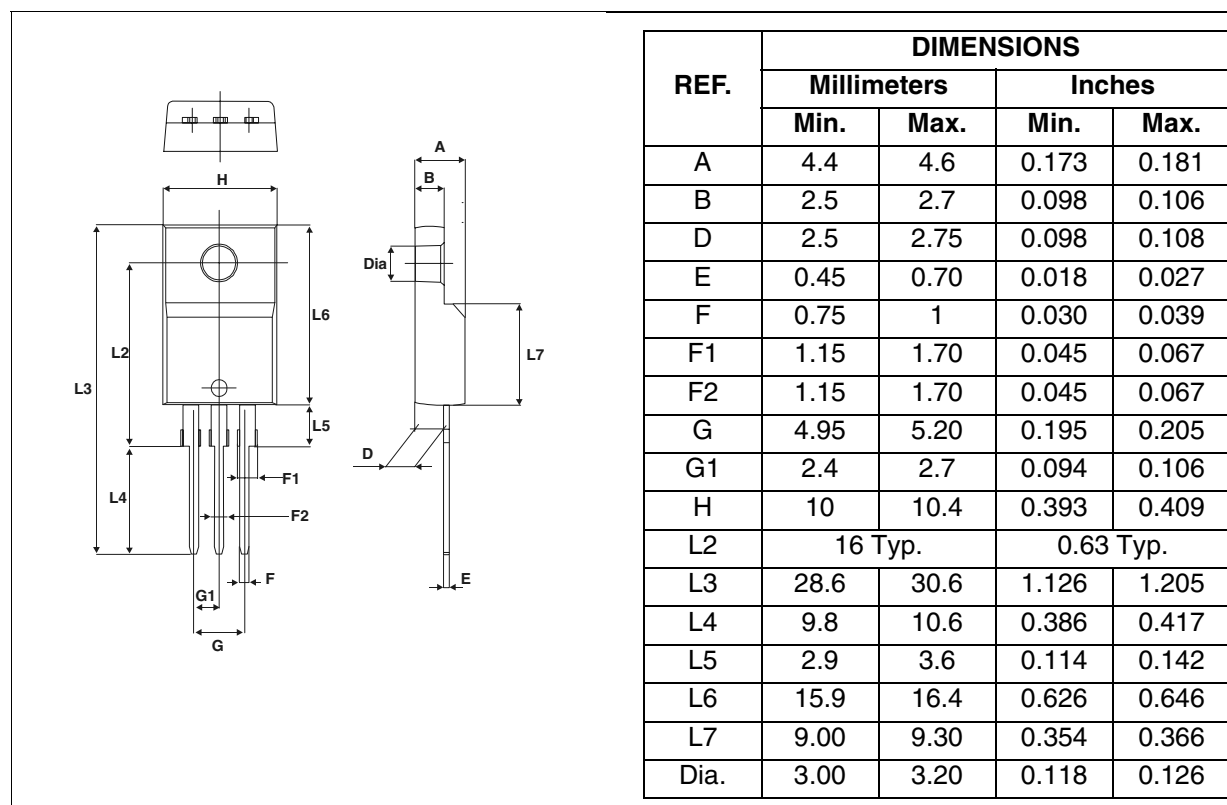


Table 6: Ordering Information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STPS2045CT	STPS2045CT	TO-220AB	2.23 g	50	Tube
STPS2045CR	STPS2045CR	I ² PAK	1.49 g	50	Tube
STPS2045CFP	STPS2045CFP	TO-220FPAB	2.0 g	50	Tube
STPS2045CG	STPS2045CG	D ² 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 ² PAK Package Mechanical Data): references b1 and b2 changed from 1.17mm to 1.70mm.

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