



# STPS20170C

## HIGH VOLTAGE POWER SCHOTTKY RECTIFIER

**Table 1: Main Product Characteristics**

$I_{F(AV)}$	<b>2 x 10 A</b>
$V_{RRM}$	<b>170 V</b>
$T_j$	<b>175°C</b>
$V_F(max)$	<b>0.75 V</b>

### Features

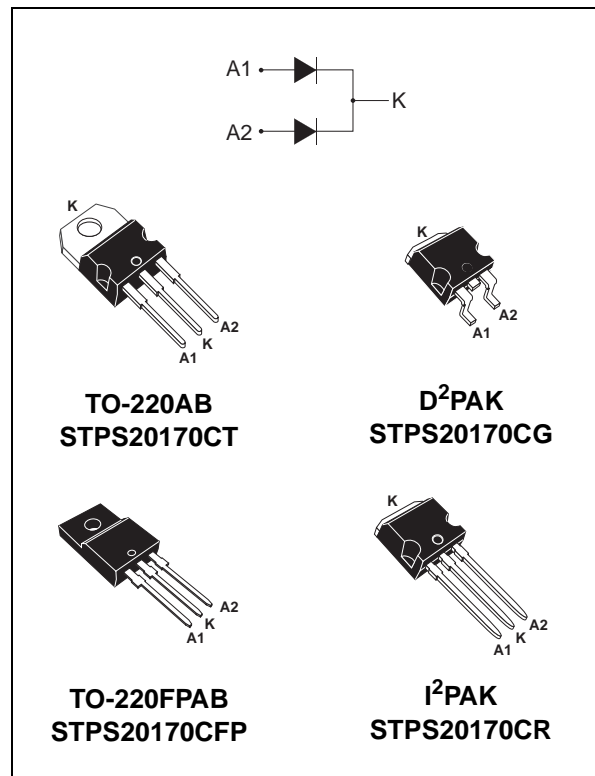
- High reverse voltage
- High junction temperature capability
- Avalanche specification with derating curves

### Benefits

- Can challenge bipolar ultrafast diodes with better dynamic characteristics.

### Description

Dual center tap Schottky rectifier diode suited for high frequency switched mode power supplies.



**Table 2: Order Codes**

Part Numbers	Marking
STPS20170CT	STPS20170CT
STPS20170CFP	STPS20170CFP
STPS20170CR	STPS20170CR
STPS20170CG	STPS20170CG
STPS20170CG-TR	STPS20170CG

## STPS20170C

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

Symbol	Parameter			Value	Unit	
$V_{RRM}$	Repetitive peak reverse voltage			170	V	
$I_{F(RMS)}$	RMS forward current			30	A	
$I_{F(AV)}$	Average forward current $\delta = 0.5$	TO-220AB / D <sup>2</sup> PAK / I <sup>2</sup> PAK	$T_c = 155^\circ\text{C}$	Per diode Per device	10 20	A
		TO-220FPAB	$T_c = 135^\circ\text{C}$	Per diode Per device	10 20	
$I_{FSM}$	Surge non repetitive forward current		$t_p = 10\text{ms}$ sinusoidal		180	A
$P_{ARM}$	Repetitive peak avalanche power		$t_p = 1\mu\text{s}$ $T_j = 25^\circ\text{C}$		6700	W
$T_{stg}$	Storage temperature range			-65 to + 175	$^\circ\text{C}$	
$T_j$	Maximum operating junction temperature *			175	$^\circ\text{C}$	
dV/dt	Critical rate of rise of reverse voltage			10000	V/ $\mu\text{s}$	

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

**Table 4: Thermal 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 Total	2.2 1.3	$^\circ\text{C/W}$
		TO-220FPAB	Per diode Total	4.5 3.5	
$R_{th(c)}$		TO-220AB / D <sup>2</sup> PAK / I <sup>2</sup> PAK	Coupling	0.3	
		TO-220FPAB		2.5	

When the diodes 1 and 2 are used simultaneously:

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

**Table 5: Static Electrical Characteristics** (per diode)

Symbol	Parameter	Tests conditions		Min.	Typ	Max.	Unit
$I_R$ *	Reverse leakage current	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			15	$\mu\text{A}$
		$T_j = 125^\circ\text{C}$				15	mA
$V_F$ **	Forward voltage drop	$T_j = 25^\circ\text{C}$	$I_F = 10\text{A}$			0.90	V
		$T_j = 125^\circ\text{C}$			0.69	0.75	
		$T_j = 25^\circ\text{C}$	$I_F = 20\text{A}$			0.99	
		$T_j = 125^\circ\text{C}$			0.79	0.86	

Pulse test: \*  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

\*\*  $t_p = 380\ \mu\text{s}$ ,  $\delta < 2\%$

To evaluate the conduction losses use the following equation:  $P = 0.64 \times I_{F(AV)} + 0.011 I_{F(RMS)}^2$

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

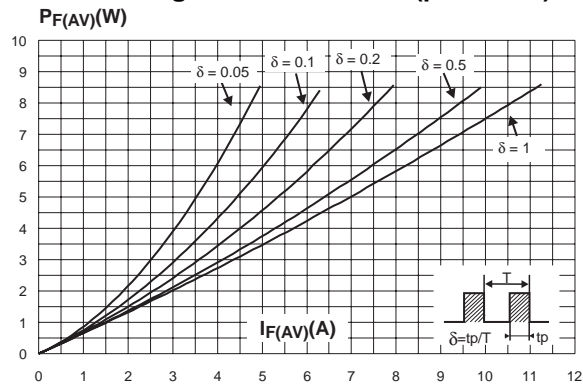


Figure 2: Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)

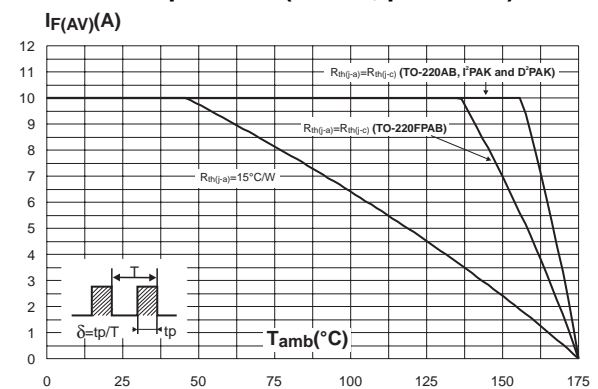


Figure 3: Normalized avalanche power derating versus pulse duration

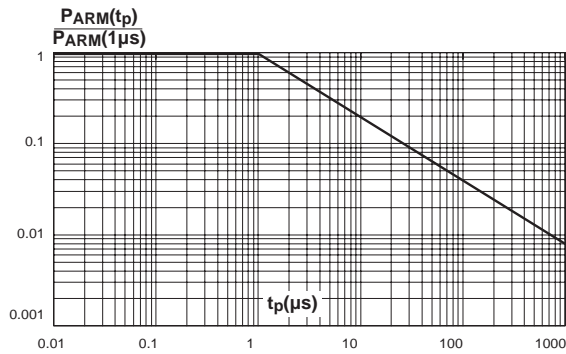


Figure 4: Normalized avalanche power derating versus junction temperature

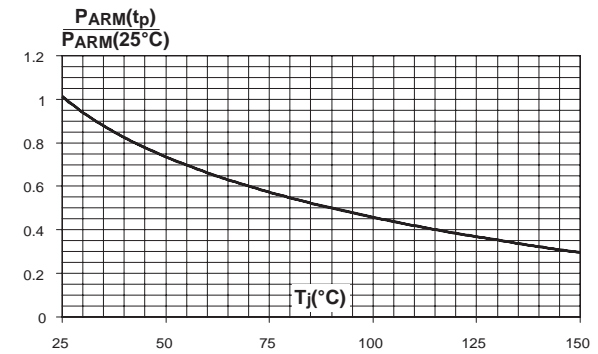


Figure 5: Non repetitive surge peak forward current versus overload duration (maximum values, per diode) (TO-220AB, D<sup>2</sup>PAK, I<sup>2</sup>PAK)

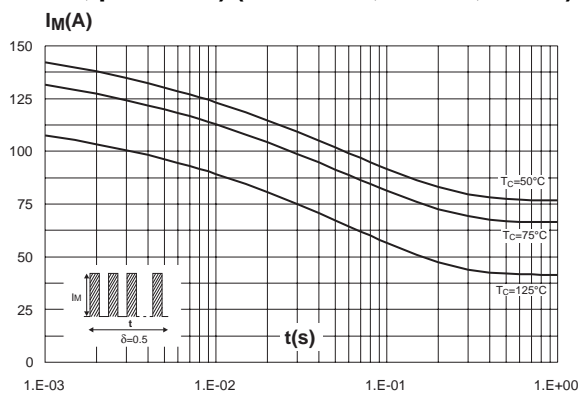
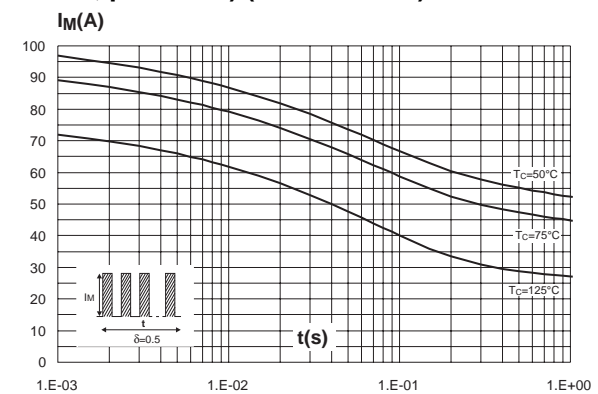
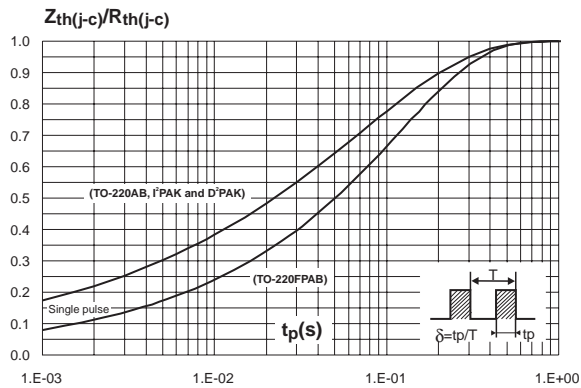


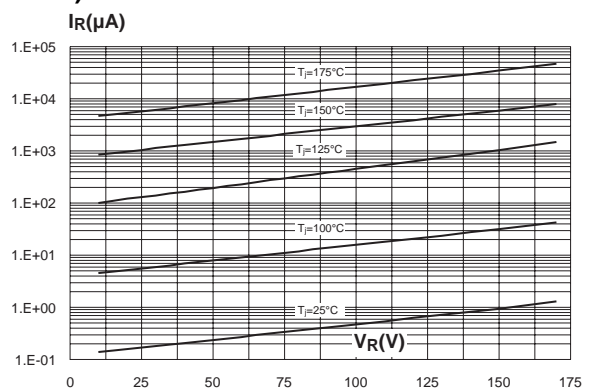
Figure 6: Non repetitive surge peak forward current versus overload duration (maximum values, per diode) (TO-220FPAB)



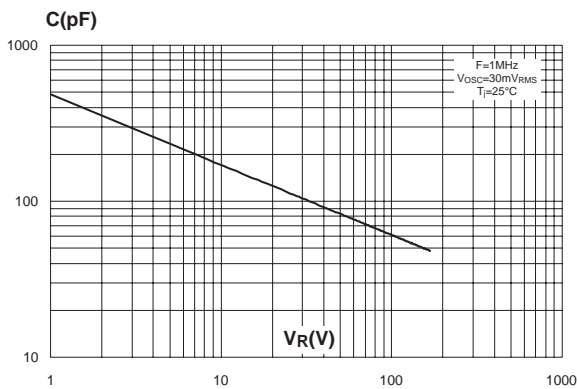
**Figure 7: Relative variation of thermal impedance junction to case versus pulse duration**



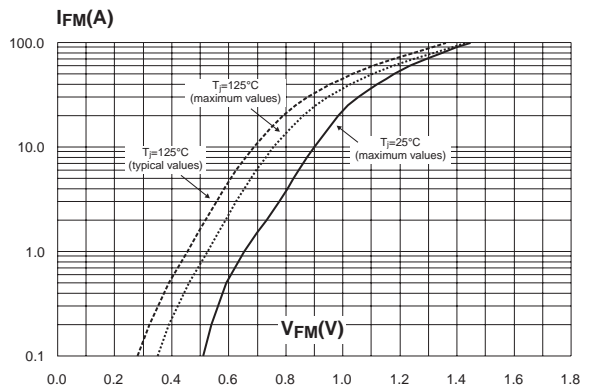
**Figure 8: Reverse leakage current versus reverse voltage applied (typical values, per diode)**



**Figure 9: Junction capacitance versus reverse voltage applied (typical values, per diode)**



**Figure 10: Forward voltage drop versus forward current (per diode)**



**Figure 11: Thermal resistance junction to ambient versus copper surface under tab (epoxy printed board FR4, Cu = 35 $\mu m$ ) (D<sup>2</sup>PAK)**

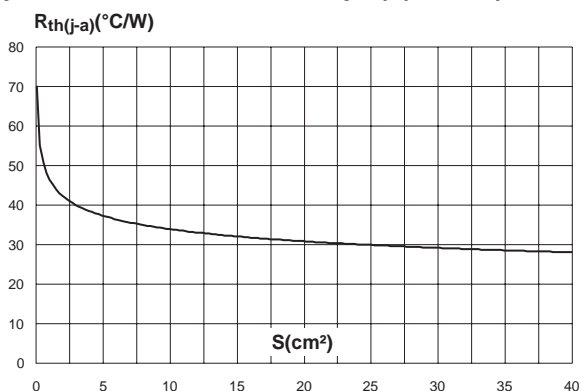


Figure 12: D<sup>2</sup>PAK Package Mechanical Data

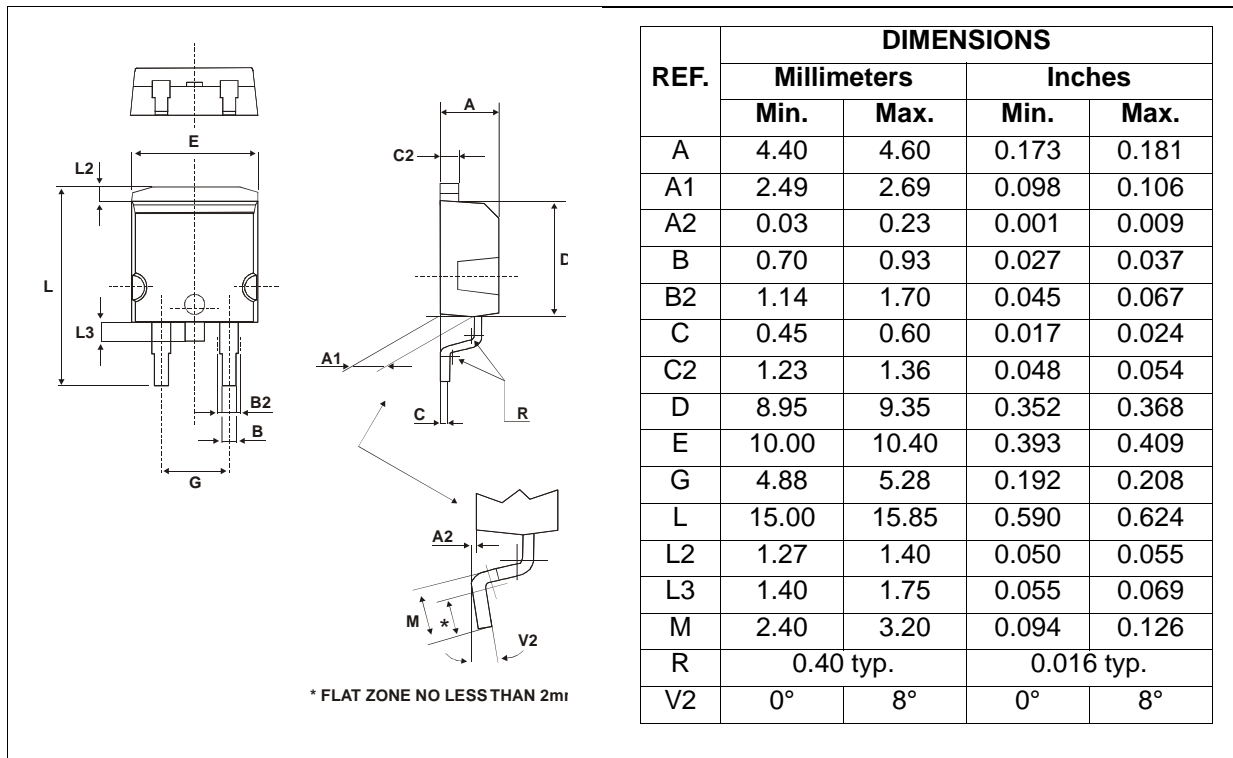


Figure 13: Foot Print Dimensions (in millimeters)

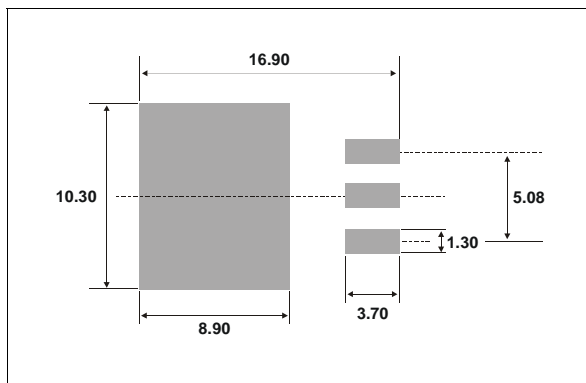


Figure 14: I<sup>2</sup>PAK Package Mechanical Data

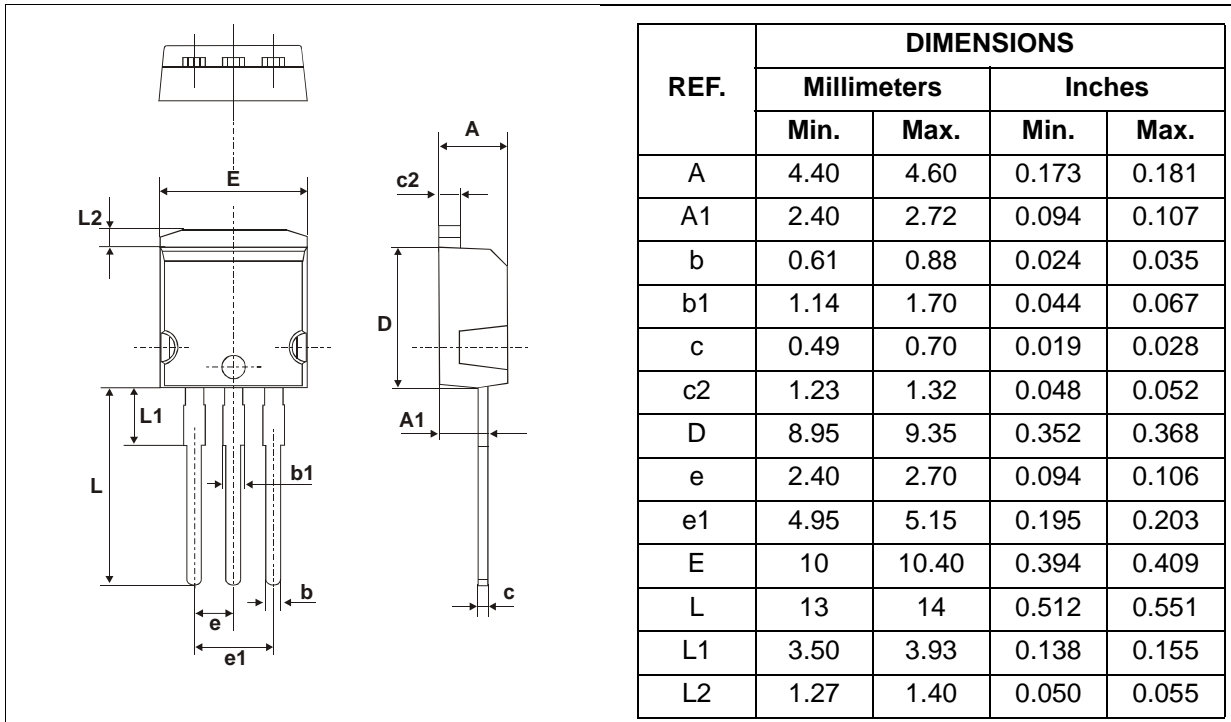


Figure 15: TO-220FPAB Package Mechanical Data

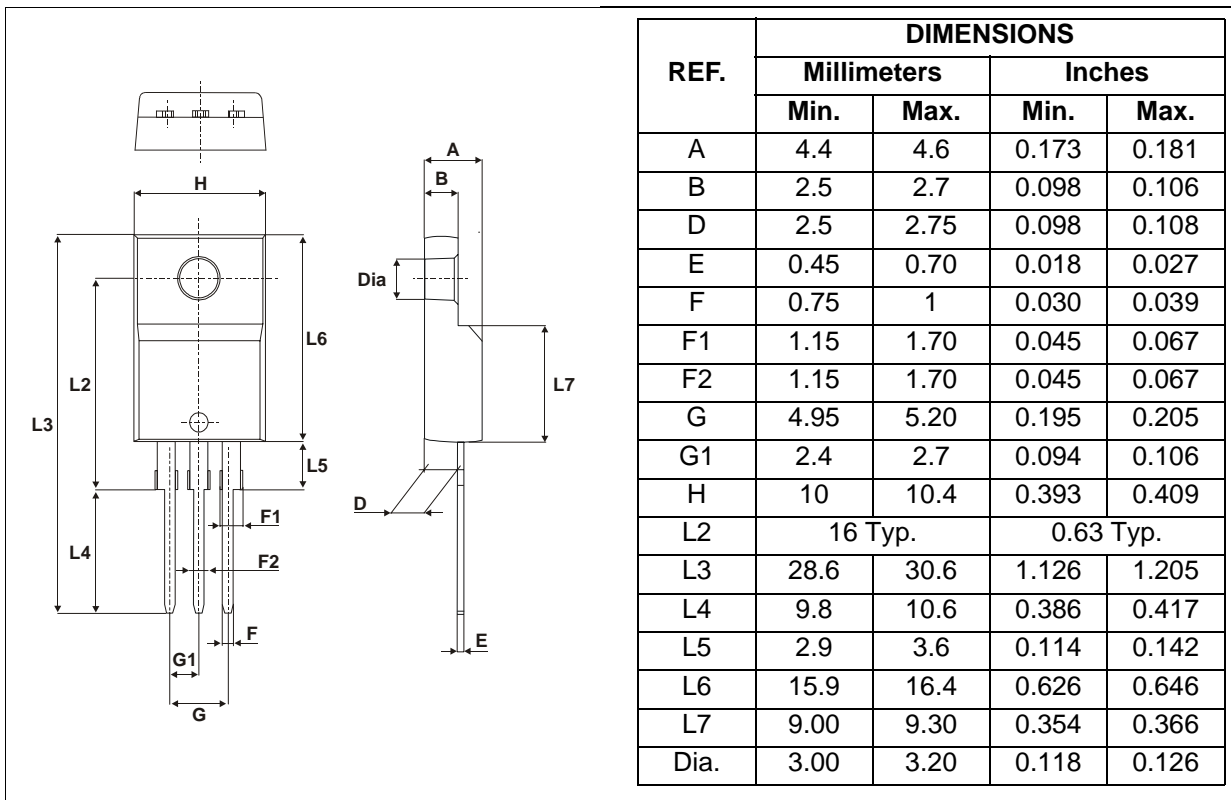


Figure 16: TO-220AB Package Mechanical Data

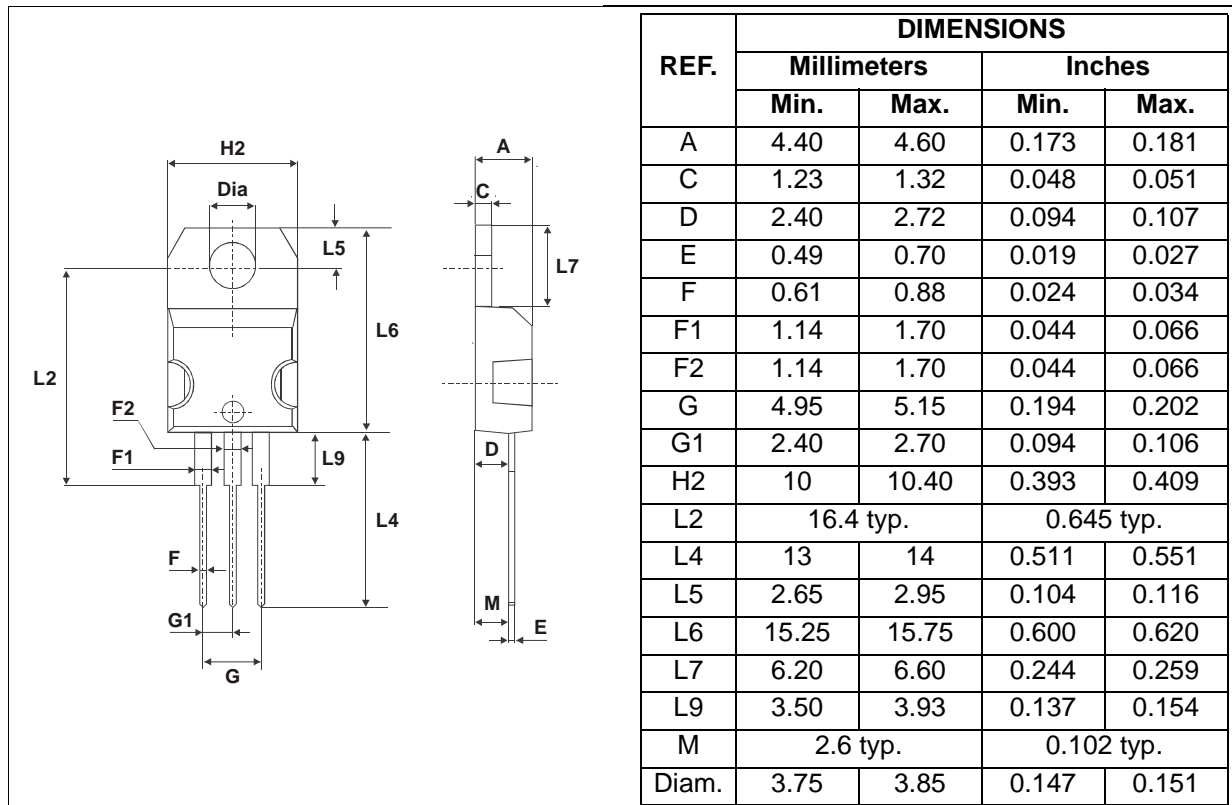


Table 6: Ordering Information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STPS20170CT	STPS20170CT	TO-220AB	2.20 g	50	Tube
STPS20170CFP	STPS20170CFP	TO-220FPAB	2 g	50	Tube
STPS20170CR	STPS20170CR	I <sup>2</sup> PAK	1.49 g	50	Tube
STPS20170CG	STPS20170CG	D <sup>2</sup> PAK	1.48 g	50	Tube
STPS20170CG-TR	STPS20170CG			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
Mar-2004	1	First issue.
28-Jul-2005	2	TO-220FPAB, I <sup>2</sup> PAK and D <sup>2</sup> PAK packages added.

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