

## Power Schottky rectifier

### Features

- Low forward voltage drop
- Negligible switching losses
- Low thermal resistance
- Avalanche capability specified

### Description

These dual center tap Schottky rectifiers are suited for switch mode power supplies and high frequency DC to DC converters.

Packaged in D<sup>2</sup>PAK, I<sup>2</sup>PAK and TO-220AB, this device is intended for use in low voltage, high frequency inverters, free-wheeling and polarity protection applications.

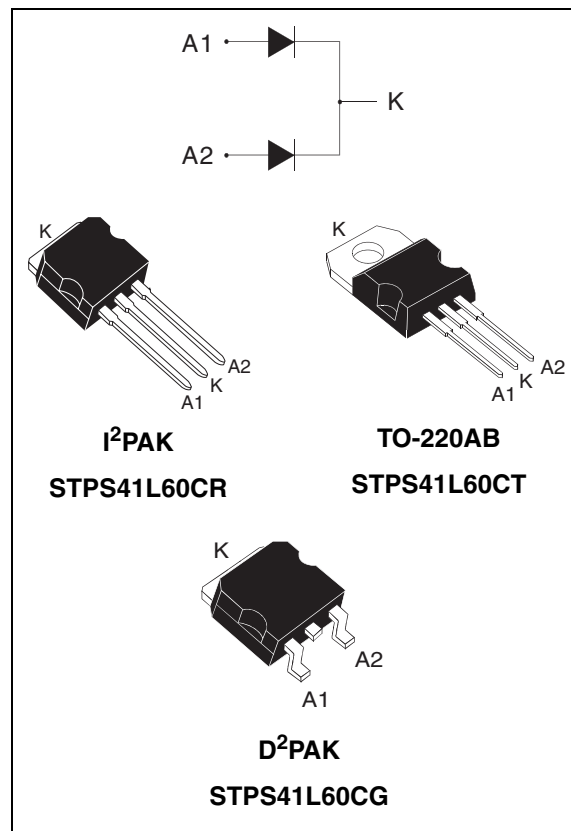


Figure 1. Electrical characteristics (a)

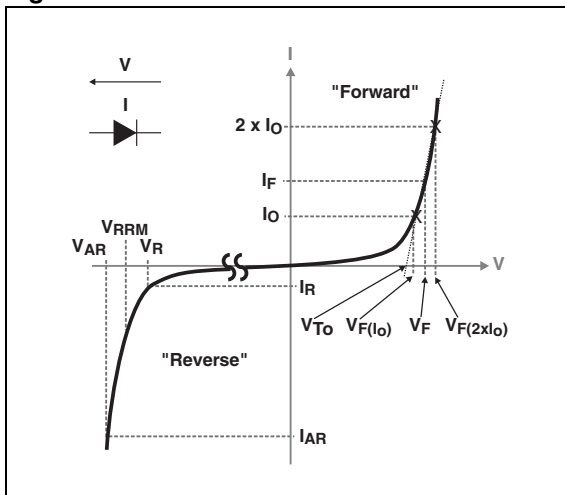


Table 1. Device summary

$I_{F(AV)}$	2 x 20 A
$V_{RRM}$	60 V
$T_j(max)$	150 °C
$V_F(max)$	0.58 V

- a.  $V_{ARM}$  and  $I_{ARM}$  must respect the reverse safe operating area defined in [Figure 12](#).  $V_{AR}$  and  $I_{AR}$  are pulse measurements ( $t_p < 1 \mu s$ ).  $V_R$ ,  $I_R$ ,  $V_{RRM}$  and  $V_F$  are static characteristics

# 1 Characteristics

**Table 2. Absolute ratings (limiting values, per diode)**

Symbol	Parameter		Value	Unit	
V <sub>RRM</sub>	Repetitive peak reverse voltage		60	V	
I <sub>F(RMS)</sub>	Forward rms current		30	A	
I <sub>F(AV)</sub>	Average forward current	T <sub>C</sub> = 125 °C	Per diode	20	A
		δ = 0.5	Per device	40	
I <sub>FSM</sub>	Surge non repetitive forward current	tp = 10 ms Sinusoidal	220	A	
P <sub>ARM</sub> <sup>(1)</sup>	Repetitive peak avalanche power	tp = 1 μs T <sub>j</sub> = 25 °C	9500	W	
V <sub>ARM</sub> <sup>(2)</sup>	Maximum repetitive peak avalanche voltage	t <sub>p</sub> < 1 μs, T <sub>j</sub> < 150 °C, I <sub>AR</sub> < 35 A	80	V	
V <sub>ASM</sub> <sup>(2)</sup>	Maximum single pulse peak avalanche voltage	t <sub>p</sub> < 1 μs, T <sub>j</sub> < 150 °C, I <sub>AR</sub> < 35 A	80	V	
T <sub>stg</sub>	Storage temperature range		-65 to + 175	°C	
T <sub>j</sub>	Maximum operating junction temperature <sup>(3)</sup>		150	°C	

1. For temperature or pulse time duration deratings, refer to [Figure 4](#) and [Figure 5](#). More details regarding the avalanche energy measurements and diode validation in the avalanche are provided in the application notes AN1768 and AN2025.
2. Refer to [Figure 12](#)
3.  $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$  condition to avoid thermal runaway for a diode on its own heatsink

**Table 3. Thermal resistances**

Symbol	Parameter		Value	Unit
R <sub>th(j-c)</sub>	Junction to case	Per diode	1.5	°C/W
		Total	0.8	
R <sub>th(c)</sub>	Coupling		0.1	

When the diodes 1 and 2 are used simultaneously :  
 $\Delta T_j(\text{diode } 1) = P(\text{diode } 1) \times R_{th(j-c)}(\text{Per diode}) + P(\text{diode } 2) \times R_{th(c)}$

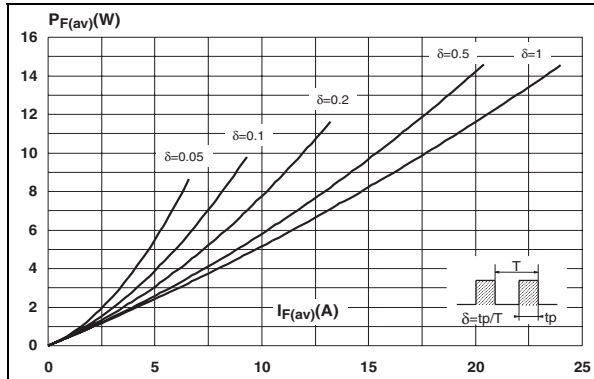
**Table 4. Static electrical characteristics (per diode)**

Symbol	Parameter	Tests conditions		Min.	Typ.	Max.	Unit
I <sub>R</sub> <sup>(1)</sup>	Reverse leakage current	T <sub>j</sub> = 25 °C	V <sub>R</sub> = V <sub>RRM</sub>			600	μA
		T <sub>j</sub> = 125 °C			100	175	mA
V <sub>F</sub> <sup>(1)</sup>	Forward voltage drop	T <sub>j</sub> = 25 °C	I <sub>F</sub> = 20 A			0.60	V
		T <sub>j</sub> = 125 °C	I <sub>F</sub> = 20 A		0.50	0.58	
		T <sub>j</sub> = 25 °C	I <sub>F</sub> = 40A			0.77	
		T <sub>j</sub> = 125 °C	I <sub>F</sub> = 40A		0.67	0.71	

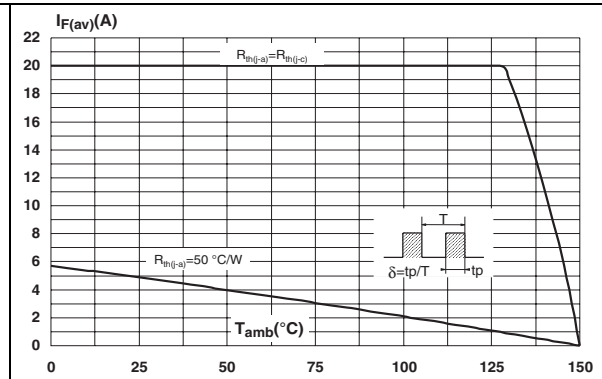
1. Pulse test: t<sub>p</sub> = 380 μs, δ < 2%

To evaluate the conduction losses use the following equation:  
 $P = 0.42 \times I_{F(AV)} + 0.007 \times I_{F(RMS)}^2$

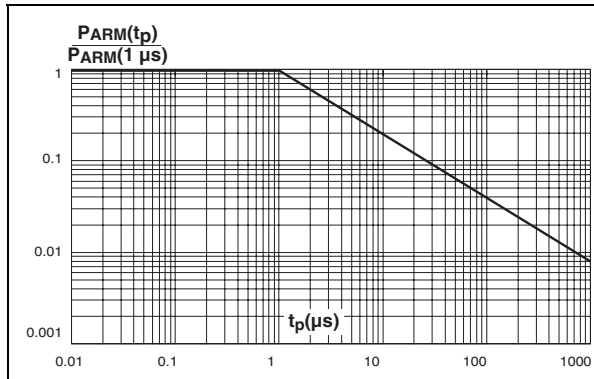
**Figure 2. Conduction losses versus average current**



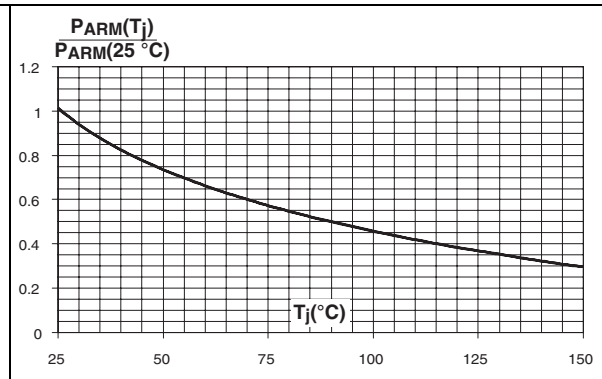
**Figure 3. Average forward current versus ambient temperature ( $\delta = 0.5$ )**



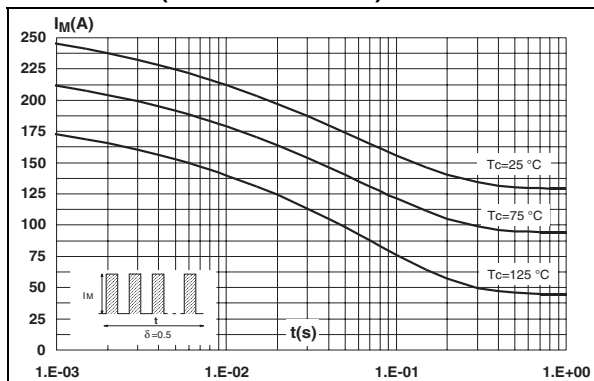
**Figure 4. Normalized avalanche power derating versus pulse duration**



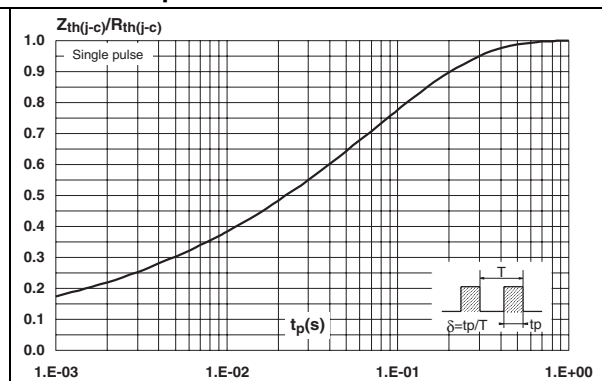
**Figure 5. Normalized avalanche power derating versus junction temperature**



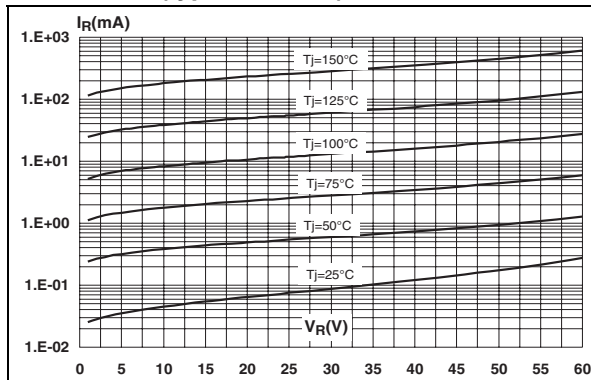
**Figure 6. Non repetitive surge peak forward current versus overload duration (maximum values)**



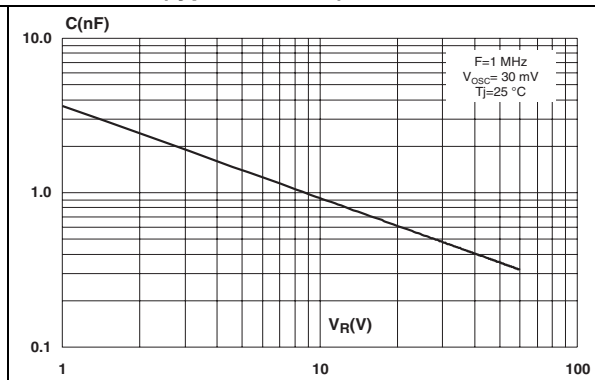
**Figure 7. Relative variation of thermal impedance junction to case versus pulse duration**



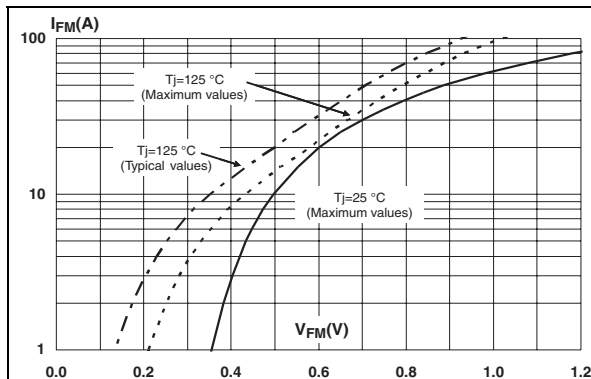
**Figure 8. Reverse leakage current versus reverse voltage applied (typical values)**



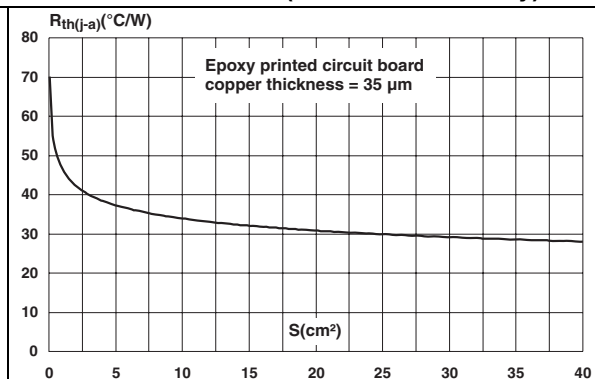
**Figure 9. Junction capacitance versus reverse voltage applied (typical values)**



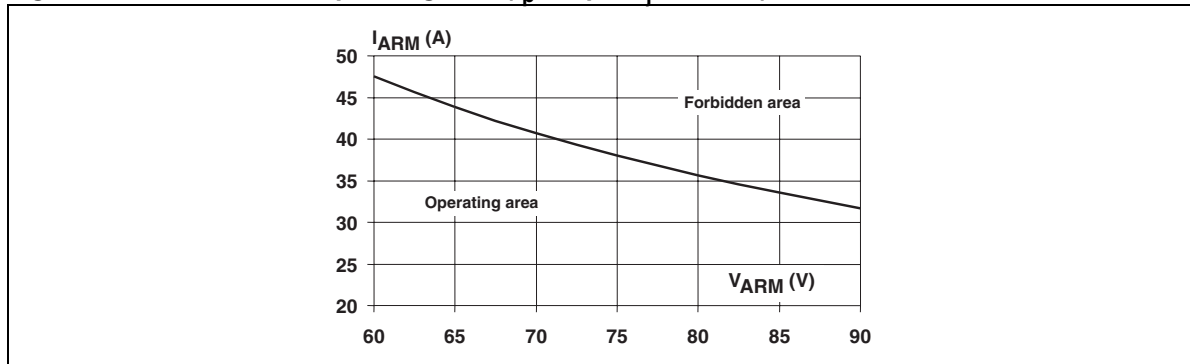
**Figure 10. Forward voltage drop versus forward current**



**Figure 11. Thermal resistance junction to ambient versus copper surface under tab (STPS41L60CG only)**



**Figure 12. Reverse safe operating area ( $t_p < 1 \mu s, T_i > 150 \text{ °C}$ )**



## 2 Package information

- Epoxy meets UL94,V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.4 to 0.6 N·m

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

**Figure 13. Package dimensions I<sup>2</sup>PAK**

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	1.17	0.044	0.046
b2	1.14	1.17	0.044	0.046
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 14. Package dimensions D<sup>2</sup>PAK

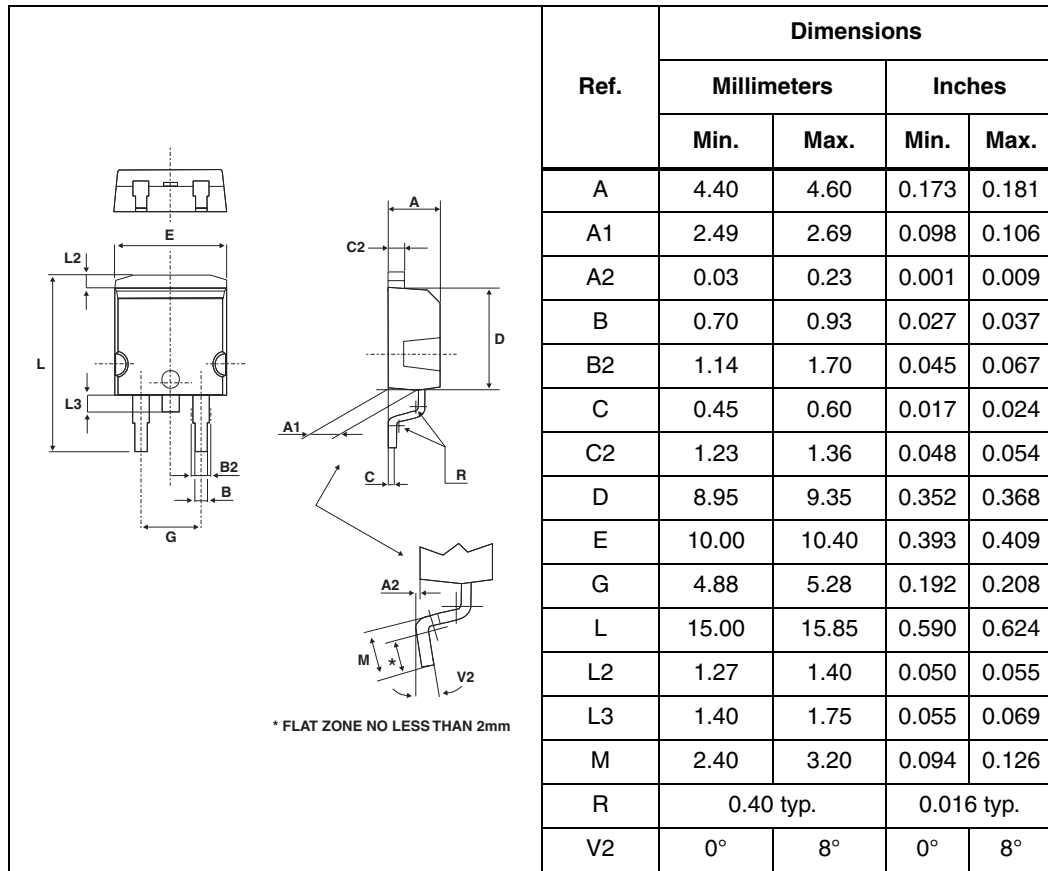


Figure 15. Footprint

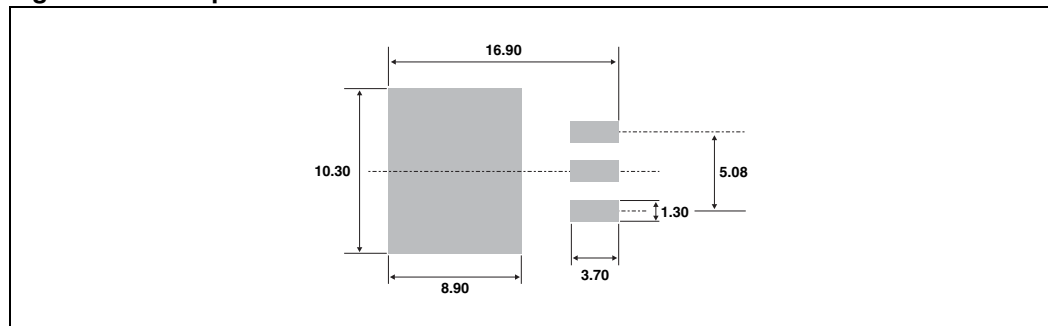
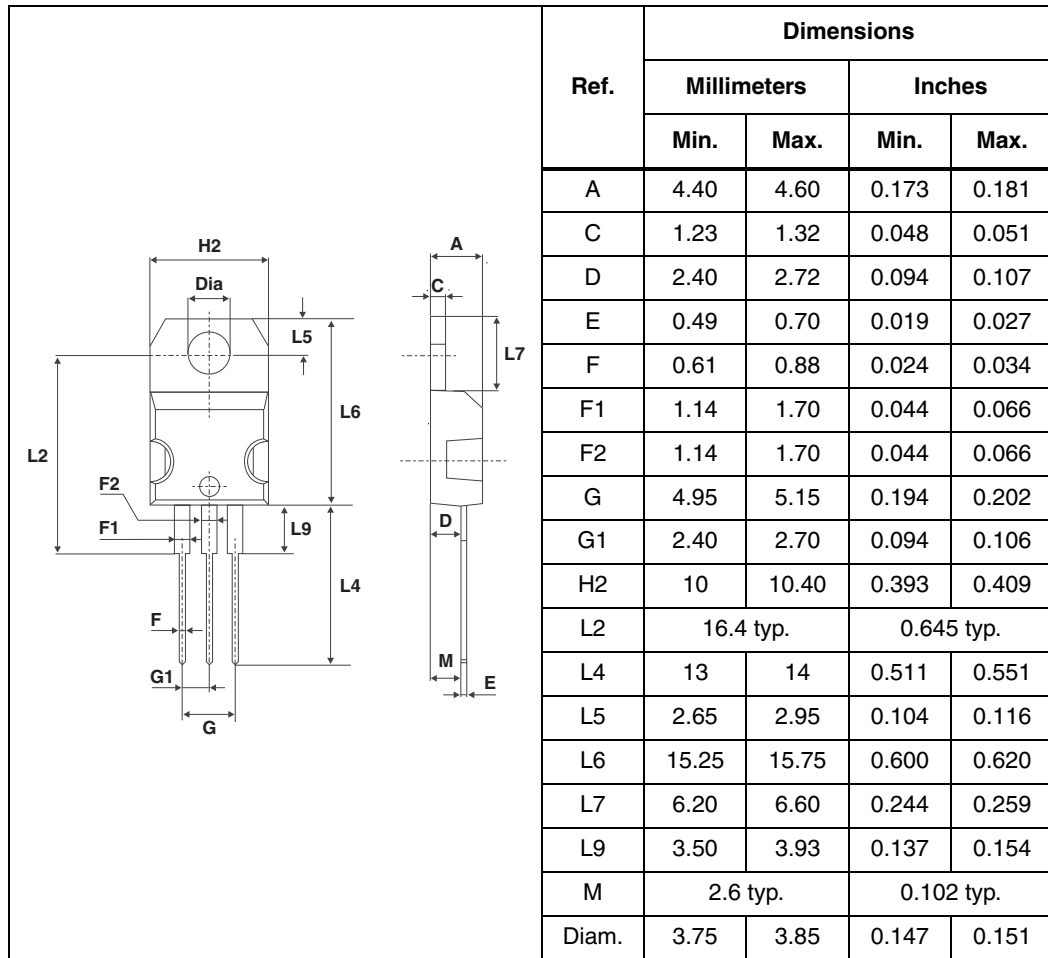


Figure 16. Package dimensions TO-220AB



### 3 Ordering information

**Table 5. Ordering information**

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS41L60CG	STPS41L60CG	D <sup>2</sup> PAK	1.48 g	50	Tube
STPS41L60CG-TR	STPS41L60CG	D <sup>2</sup> PAK	1.48 g	1000	Tape and reel
STPS41L60CT	STPS41L60CT	TO-220AB	2.20 g	50	Tube
STPS41L60CR	STPS41L60CR	I <sup>2</sup> PAK	1.49 g	50	Tube

### 4 Revision history

**Table 6. Document revision history**

Date	Revision	Changes
July 2003	3A	Previous issue
10-Jan-2007	4	Reformatted to current standards. Added ECOPACK statement Removed $I_{RRM}$ and $dV/dT$ from the Absolute ratings table on page 1. Updated reverse leakage current values in Table 3 and Figure 7.
28-May-2007	5	Updated figures 1, 2, and 5 to 10.
15-Jul-2011	6	Added electrical diagram on first page. Added parameters $V_{ARM}$ and $V_{ASM}$ to <a href="#">Table 2</a> . Added <a href="#">Figure 12</a> .



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