

# 1 Characteristics

**Table 1. Absolute ratings (limiting values, per diode, at 25 °C, unless otherwise specified)**

Symbol	Parameter			Value	Unit
V <sub>RRM</sub>	Repetitive peak reverse voltage			100	V
I <sub>F(RMS)</sub>	Forward rms current			30	A
I <sub>F(AV)</sub>	Average forward current, δ = 0.5 square wave	T <sub>c</sub> = 150 °C	Per diode	20	A
			Per device	40	
I <sub>FSM</sub>	Surge non repetitive forward current	t <sub>p</sub> = 10 ms sinusoidal		220	A
P <sub>ARM</sub>	Repetitive peak avalanche power	t <sub>p</sub> = 10 μs, T <sub>j</sub> = 125 °C		1300	W
T <sub>stg</sub>	Storage temperature range			-65 to +175	°C
T <sub>j</sub>	Maximum operating junction temperature range <sup>(1)</sup>			175	°C

1.  $(dP_{tot}/dT_j) < (1/R_{th(j-a)})$  condition to avoid thermal runaway for a diode on its own heatsink.

**Table 2. Thermal resistance parameters**

Symbol	Parameter		Max. value	Unit
$R_{th(j-c)}$	Junction to case	Per diode	1.5	°C/W
		Total	0.8	
$R_{th(c)}$	Coupling		0.1	

When the diodes 1 and 2 are used simultaneously :

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

For more information, please refer to the following application note:

- AN5088 : Rectifiers thermal management, handling and mounting recommendations

**Table 3. Static electrical characteristics (per diode)**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-		10	$\mu\text{A}$
		$T_j = 125\text{ °C}$		-	3	10	mA
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 20\text{ A}$	-		0.80	V
		$T_j = 125\text{ °C}$		-	0.62	0.67	
		$T_j = 25\text{ °C}$	$I_F = 40\text{ A}$	-		0.90	
		$T_j = 125\text{ °C}$		-	0.70	0.76	

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

2. Pulse test:  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

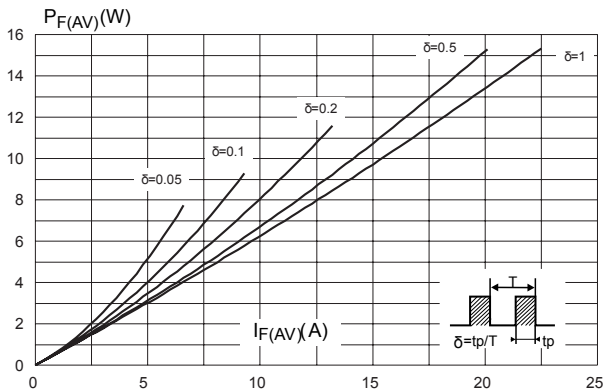
To evaluate the conduction losses, use the following equation:  $P = 0.58 \times I_{F(AV)} + 0.0045 \times I_F^2(RMS)$

For more information, please refer to the following application notes related to the power losses :

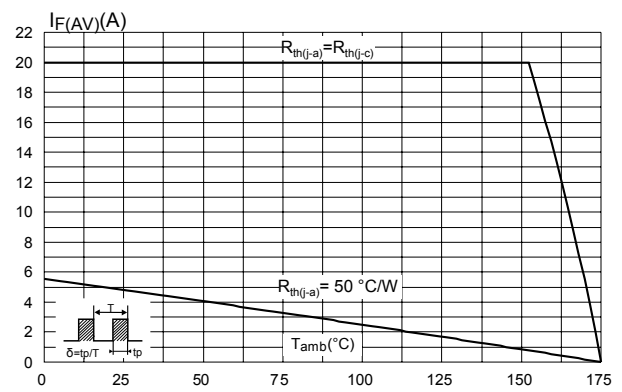
- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

## 1.1 Characteristics (curves)

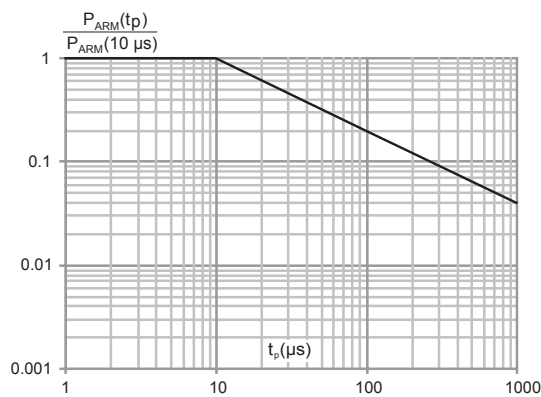
**Figure 1. Average forward power dissipation versus average forward current (per diode)**



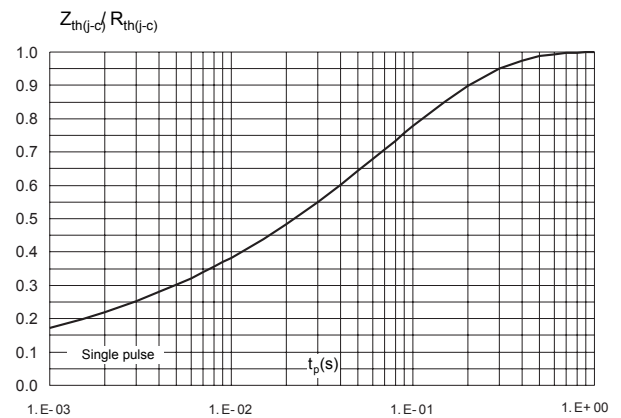
**Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)**



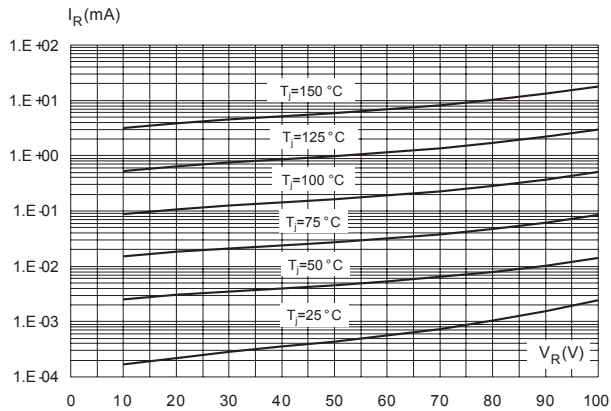
**Figure 3. Normalized avalanche power derating versus pulse duration ( $T_j = 125^\circ\text{C}$ )**



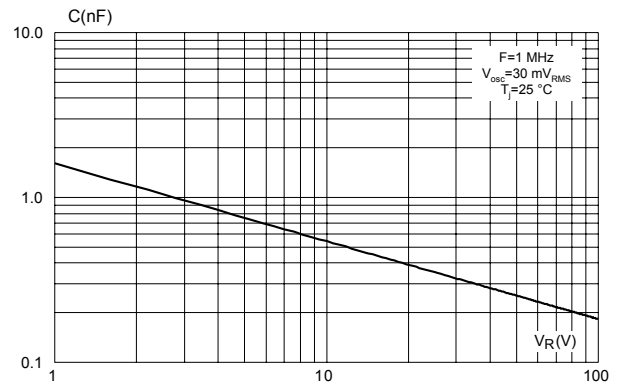
**Figure 4. Relative variation of thermal impedance junction to case versus pulse duration**



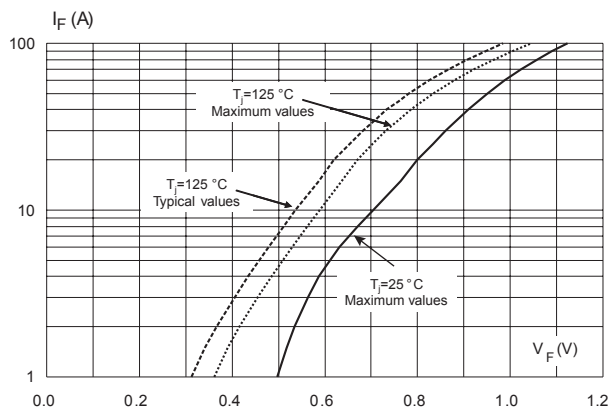
**Figure 5. Reverse leakage current versus reverse voltage applied (typical values, per diode)**



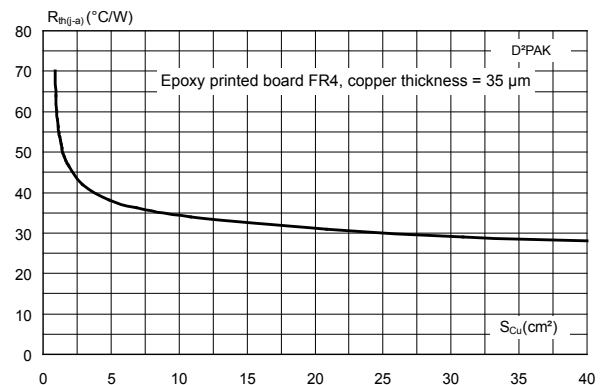
**Figure 6. Junction capacitance versus reverse voltage applied (typical values, per diode)**



**Figure 7. Forward voltage drop versus forward current (per diode)**



**Figure 8. Thermal resistance junction to ambient versus copper surface under tab**



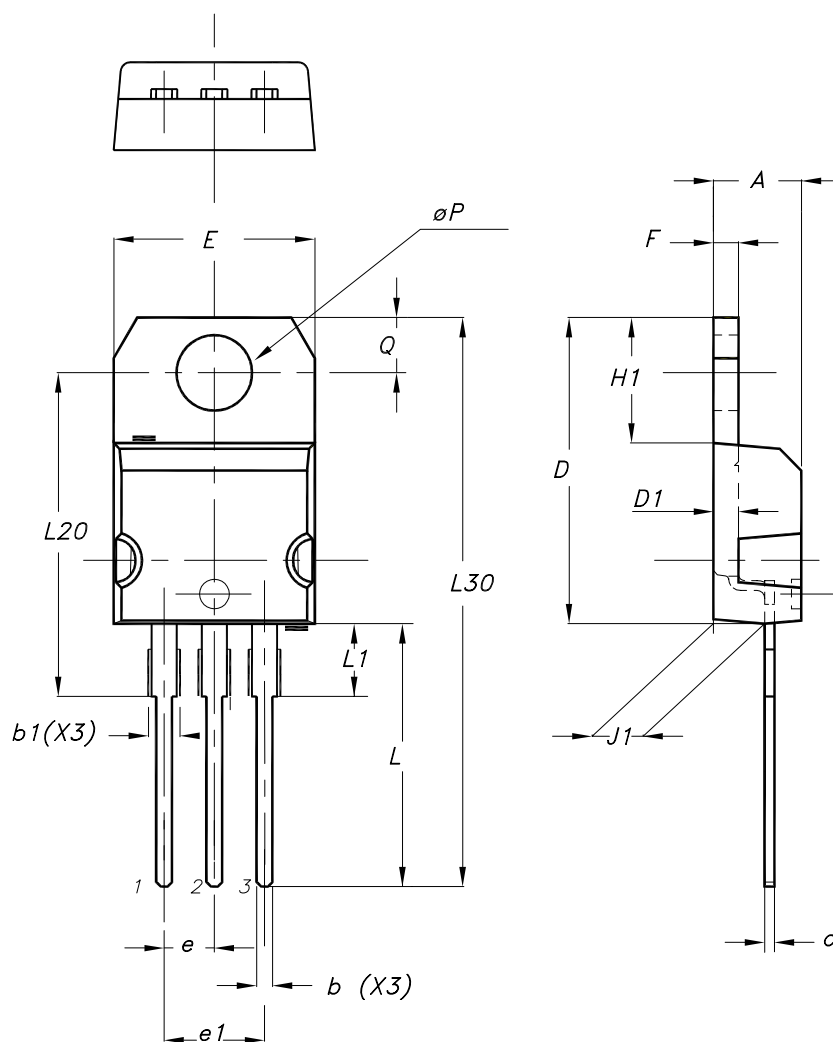
## 2 Package information

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

### 2.1 TO-220AB package information

- Epoxy meets UL 94,V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.70 N·m

**Figure 9. TO-220AB package outline**



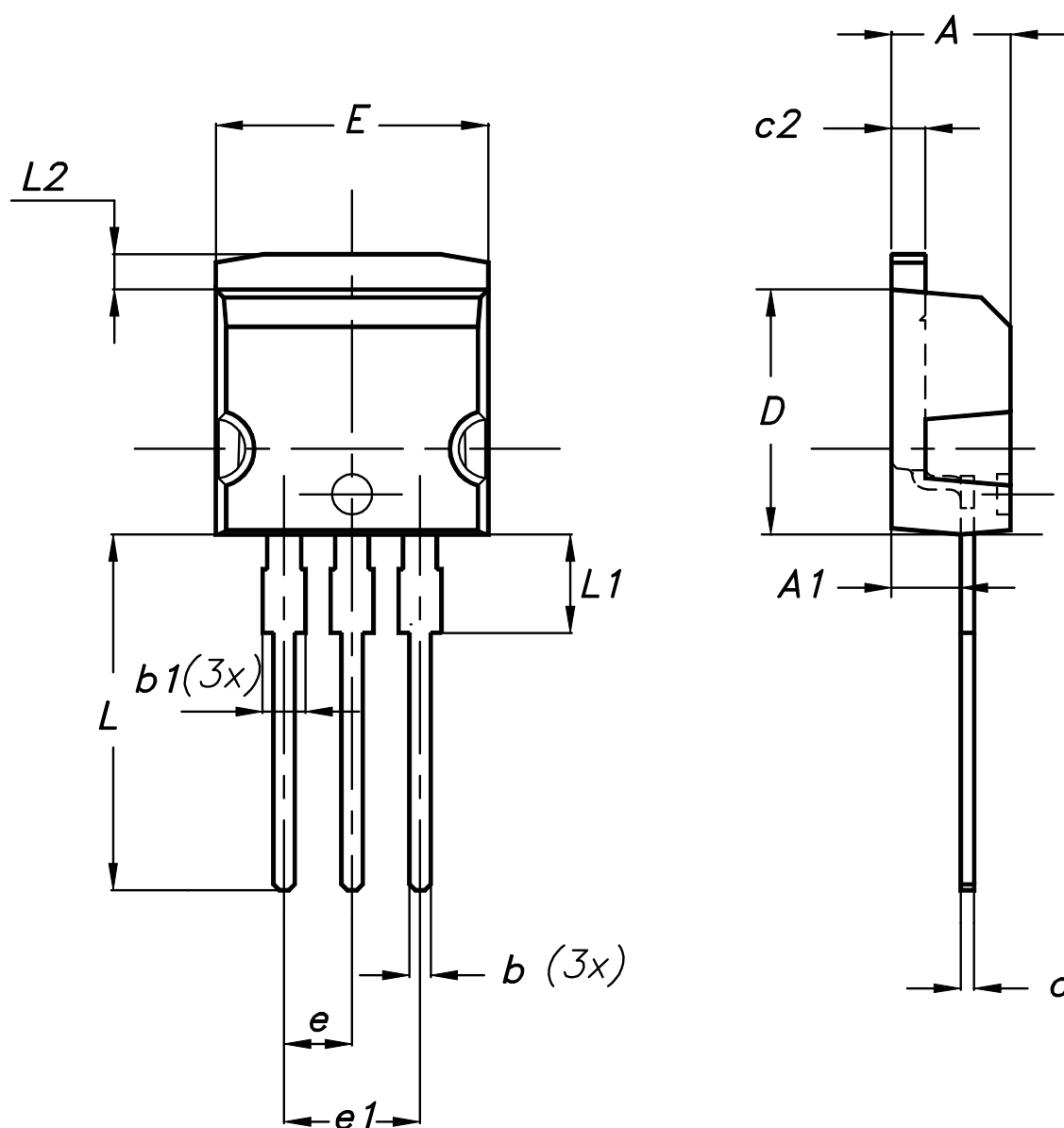
**Table 4. TO-220AB package mechanical data**

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
b	0.61	0.88	0.240	0.035
b1	1.14	1.55	0.045	0.061
c	0.48	0.70	0.019	0.028
D	15.25	15.75	0.600	0.620
D1	1.27 typ.		0.050 typ.	
E	10.00	10.40	0.394	0.409
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
F	1.23	1.32	0.048	0.052
H1	6.20	6.60	0.244	0.260
J1	2.40	2.72	0.094	0.107
L	13.00	14.00	0.512	0.551
L1	3.50	3.93	0.138	0.155
L20	16.40 typ.		0.646 typ.	
L30	28.90 typ.		1.138 typ.	
θP	3.75	3.85	0.148	0.152
Q	2.65	2.95	0.104	0.116

## 2.2 I<sup>2</sup>PAK package information

- Epoxy meets UL 94, V0
- Cooling method: by conduction (C)

Figure 10. I<sup>2</sup>PAK package outline



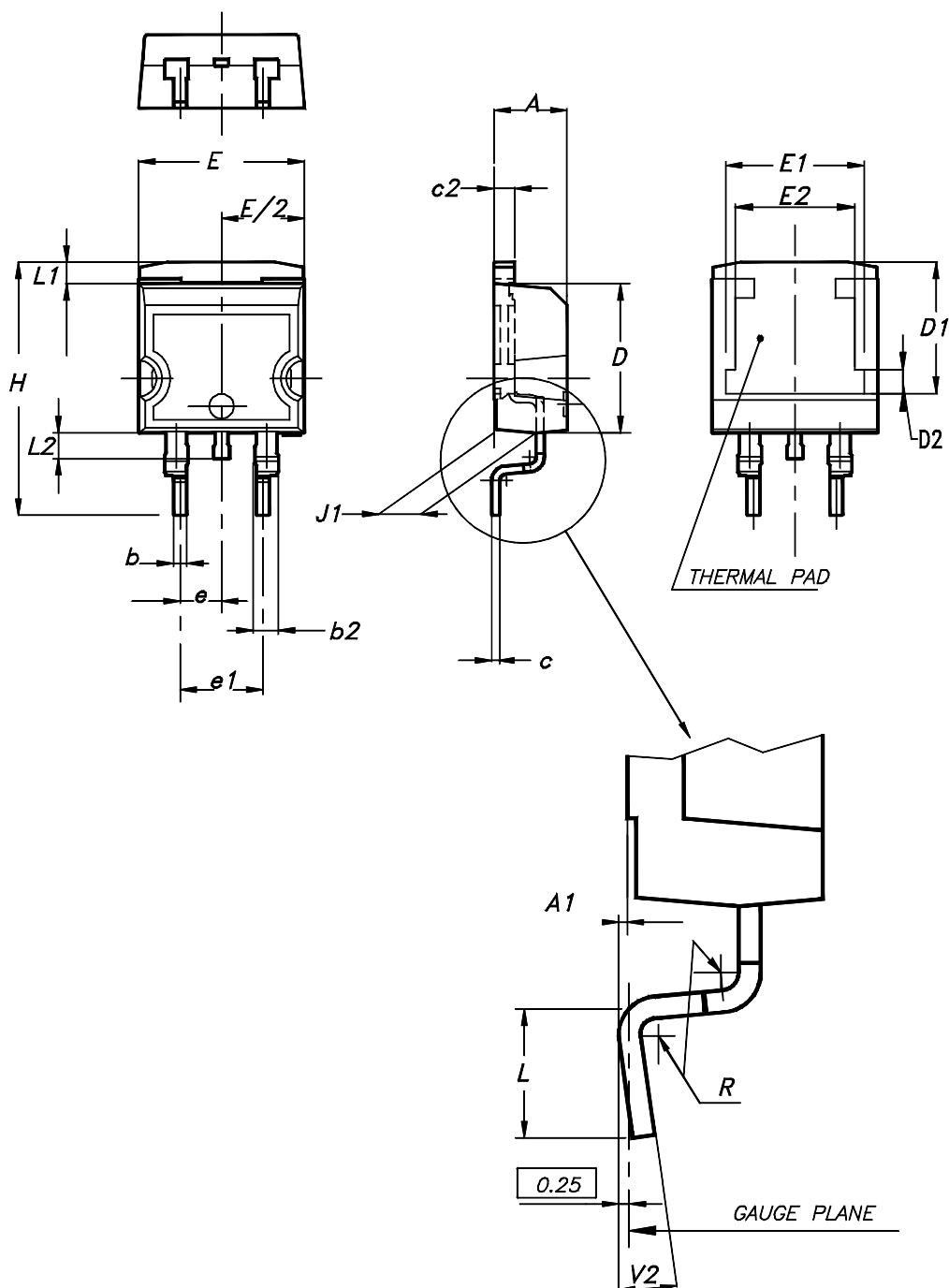
**Table 5.** I<sup>2</sup>PAK package mechanical data

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.40	2.72	0.094	0.107
b	0.61	0.88	0.024	0.035
b1	1.14	1.70	0.044	0.067
c	0.49	0.70	0.019	0.028
c2	1.23	1.32	0.048	0.052
D	8.95	9.35	0.352	0.368
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
E	10.00	10.40	0.394	0.409
L	13.00	14.00	0.512	0.551
L1	3.50	3.93	0.138	0.155
L2	1.27	1.40	0.050	0.055

## 2.3 D<sup>2</sup>PAK package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)

Figure 11. D<sup>2</sup>PAK package outline



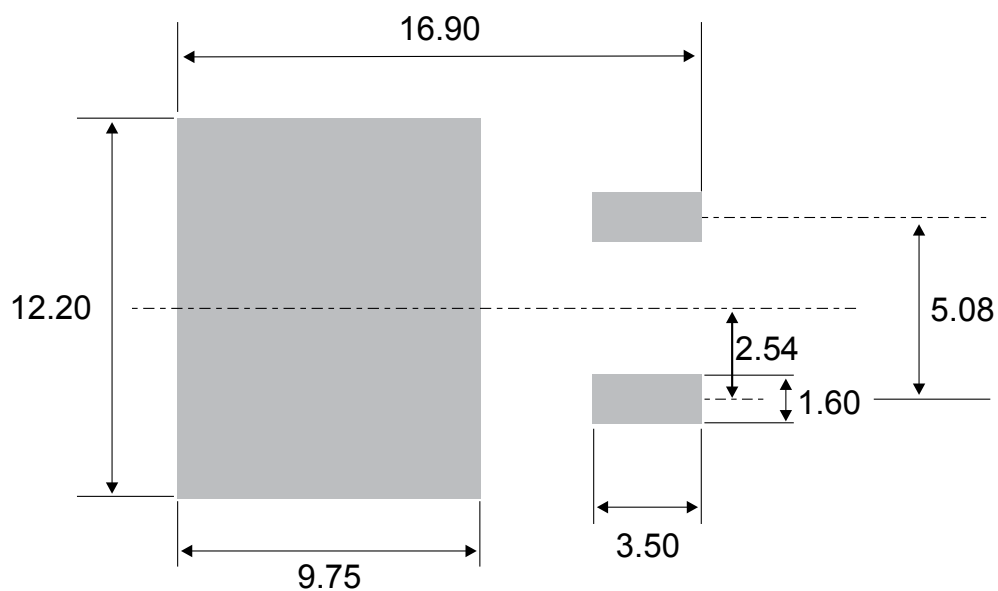
**Note:** This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.



**Table 6. D<sup>2</sup>PAK package mechanical data**

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	Min.	Max.	Min.	Max.
A	4.36	4.60	0.172	0.181
A1	0.00	0.25	0.000	0.010
b	0.70	0.93	0.028	0.037
b2	1.14	1.70	0.045	0.067
c	0.38	0.69	0.015	0.027
c2	1.19	1.36	0.047	0.053
D	8.60	9.35	0.339	0.368
D1	6.90	8.00	0.272	0.311
D2	1.10	1.50	0.043	0.060
E	10.00	10.55	0.394	0.415
E1	8.10	8.90	0.319	0.346
E2	6.85	7.25	0.266	0.282
e	2.54 typ.		0.100	
e1	4.88	5.28	0.190	0.205
H	15.00	15.85	0.591	0.624
J1	2.49	2.90	0.097	0.112
L	1.90	2.79	0.075	0.110
L1	1.27	1.65	0.049	0.065
L2	1.30	1.78	0.050	0.070
R	0.4 typ.		0.015	
V2	0°	8°	0°	8°

**Figure 12. D<sup>2</sup>PAK recommended footprint (dimensions in mm)**



### 3 Ordering information

**Table 7. Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS41H100CT	STPS41H100CT	TO-220AB	1.95 g	50	Tube
STPS41H100CG	STPS41H100CG	D <sup>2</sup> PAK	1.38 g	50	Tube
STPS41H100CG-TR	STPS41H100CG	D <sup>2</sup> PAK	1.38 g	10000	Tape and reel
STPS41H100CR	STPS41H100CR	I <sup>2</sup> PAK	1.50 g	30	Tube

## Revision history

**Table 8. Document revision history**

Date	Version	Changes
Jul-2003	3A	Previous release.
15-Jul-2011	4	Updated Table 5.
11-Apr-2012	5	Removed order codes STPS41H100CR-H and STPS41H100CT-H. Replaced paragraph under Table 5.
27-Jun-2018	6	Updated Table 1. Absolute ratings (limiting values, per diode, at 25 °C, unless otherwise specified). Updated Section 1.1 Characteristics (curves).

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