

# 1 Characteristics

**Table 1. Absolute ratings (limiting values with anode terminals short circuited, at 25 °C unless otherwise specified)**

Symbol	Parameter			Value	Unit
$V_{RRM}$	Repetitive peak reverse voltage			100	V
$I_{F(RMS)}$	Forward rms current			30	A
$I_{F(AV)}$	Average forward current $\delta = 0.5$ , square wave	TO-220AB D <sup>2</sup> PAK I <sup>2</sup> PAK	$T_C = 130\text{ °C}$	20	A
		TO-220FPAB	$T_C = 85\text{ °C}$		
$I_{FSM}$	Surge non repetitive forward current			$t_p = 10\text{ ms}$ sinusoidal	350 A
$P_{ARM}$	Repetitive peak avalanche power			$t_p = 10\text{ }\mu\text{s}$ , $T_j = 125\text{ °C}$	1150 W
$T_{stg}$	Storage temperature range			-65 to +175	°C
$T_j$	Maximum operating junction temperature <sup>(1)</sup>			+150	°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 parameter**

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AB, D <sup>2</sup> PAK, I <sup>2</sup> PAK	1.2	°C/W
		TO-220FPAB	4	

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

- AN5088 : Rectifiers thermal management, handling and mounting recommendations

**Table 3. Static electrical characteristics (anode terminals short circuited)**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R$ <sup>(1)</sup>	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = 70\text{ V}$	-	5		$\mu\text{A}$
		$T_j = 125\text{ °C}$		-	5		mA
		$T_j = 25\text{ °C}$	$V_R = 100\text{ V}$	-	10	40	$\mu\text{A}$
		$T_j = 125\text{ °C}$		-	10	40	mA
$V_F$ <sup>(2)</sup>	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 5\text{ A}$	-	550		mV
		$T_j = 125\text{ °C}$		-	455		
		$T_j = 25\text{ °C}$	$I_F = 10\text{ A}$	-	660	730	
		$T_j = 125\text{ °C}$		-	530	600	
		$T_j = 25\text{ °C}$	$I_F = 20\text{ A}$	-	775	850	
		$T_j = 125\text{ °C}$		-	610	690	

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:

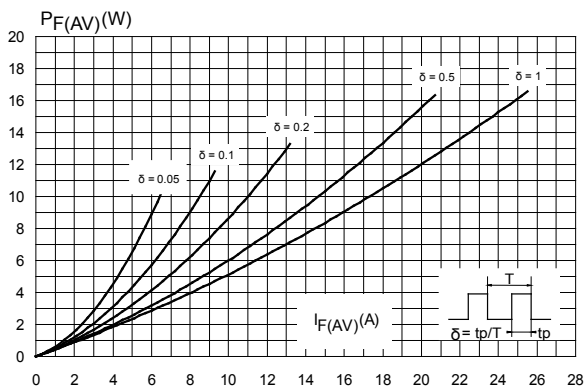
$$P = 0.425 \times I_{F(AV)} + 0.0088 \times I_F^2 (RMS)$$

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

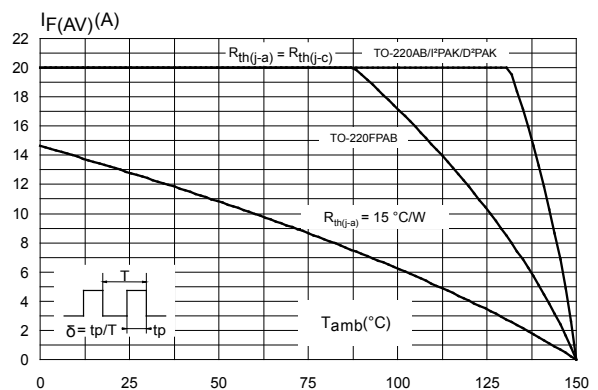
- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

## 1.1 Characteristics (curves)

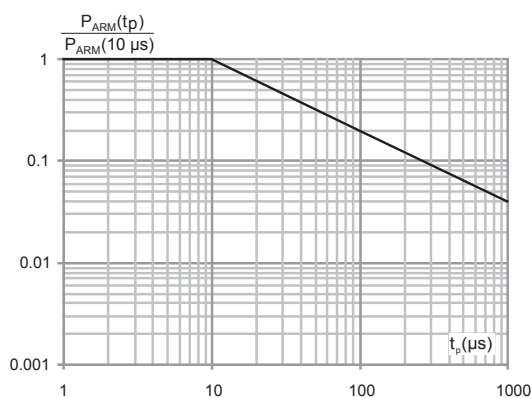
**Figure 1. Average forward power dissipation versus average forward current (anode terminals short circuited)**



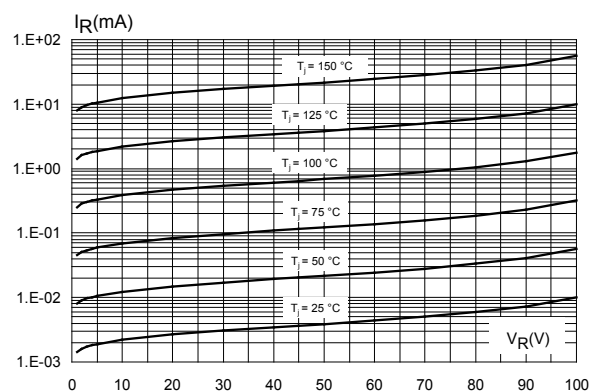
**Figure 2. Average forward current versus ambient temperature (delta = 0.5, anode terminals short circuited)**



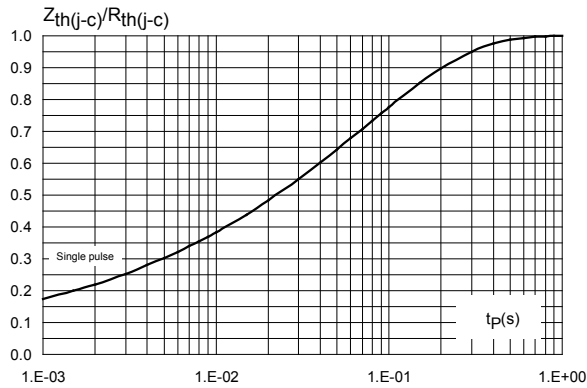
**Figure 3. Normalized avalanche power derating versus pulse duration (T\_j = 125 °C)**



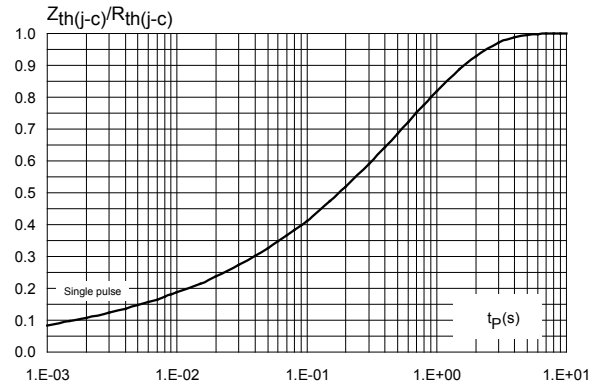
**Figure 4. Reverse leakage current versus reverse voltage applied (typical values)**



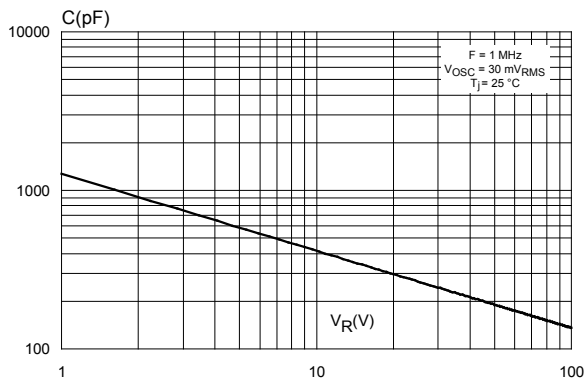
**Figure 5. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB, D<sup>2</sup>PAK, I<sup>2</sup>PAK)**



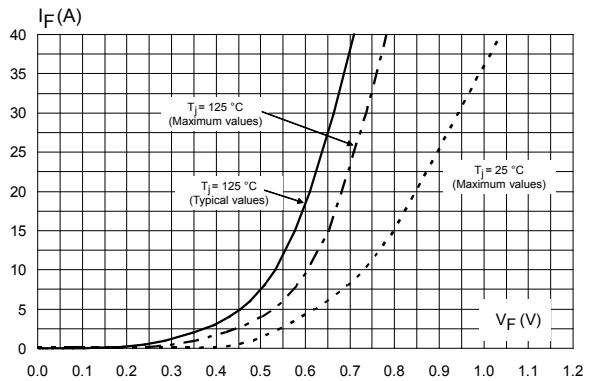
**Figure 6. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)**



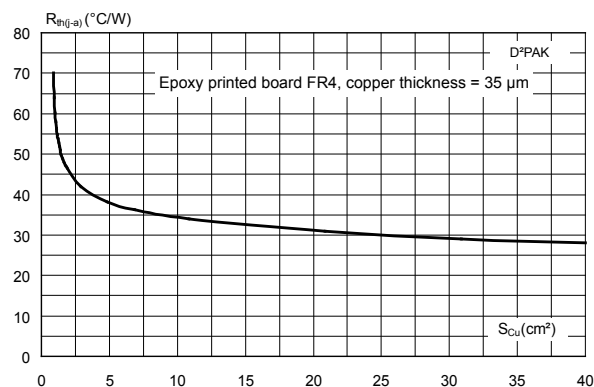
**Figure 7. Junction capacitance versus reverse voltage applied (typical values)**



**Figure 8. Forward voltage drop versus forward current (anode terminals short circuited)**



**Figure 9. Thermal resistance junction to ambient versus copper surface under tab for D<sup>2</sup>PAK**



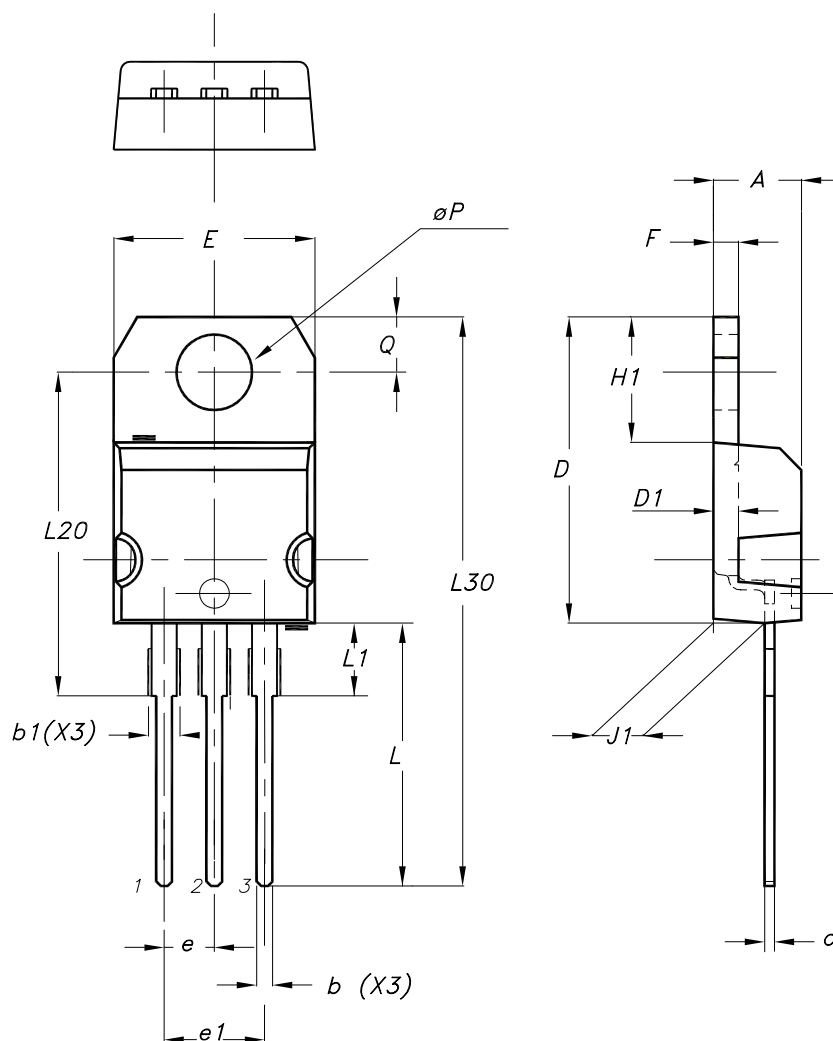
## 2 Package information

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 10. TO-220AB package outline**



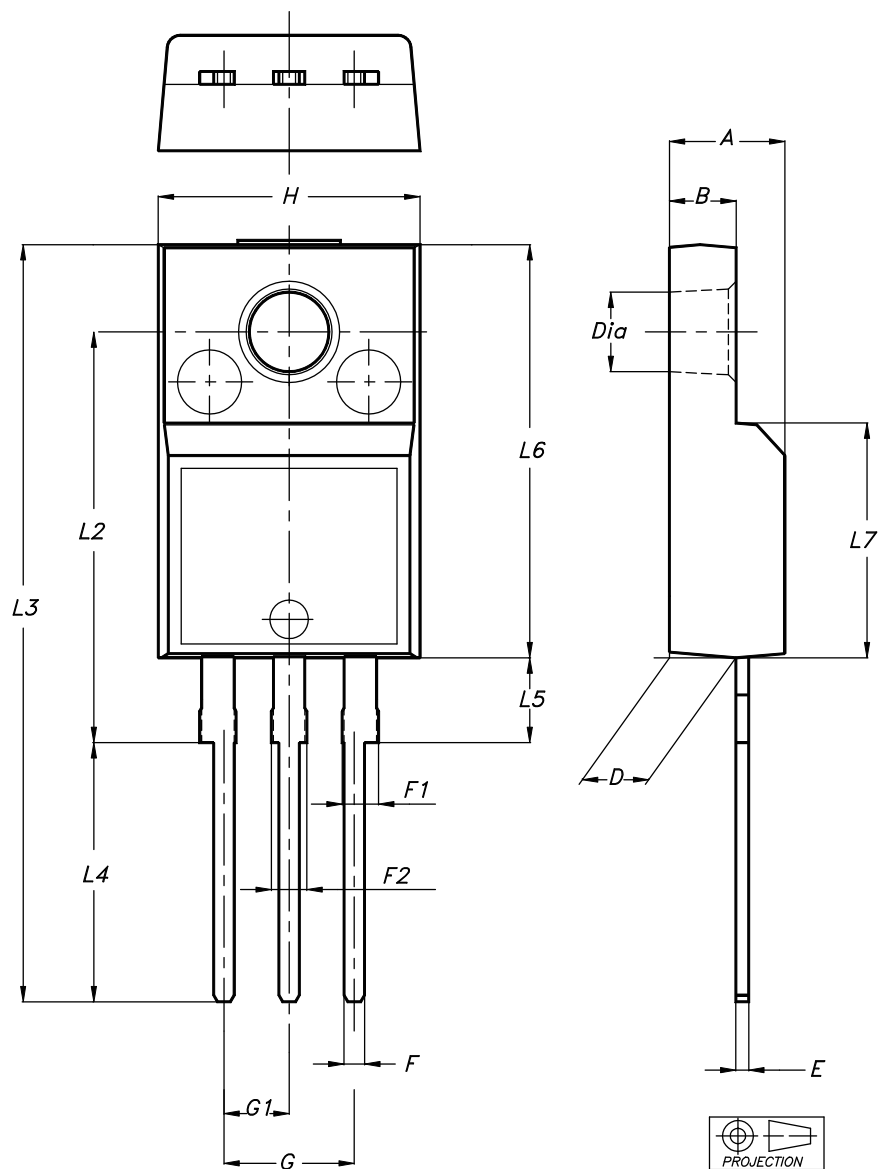
**Table 4. TO-220AB package mechanical data**

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 TO-220FPAB 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 11. TO-220FPAB package outline**



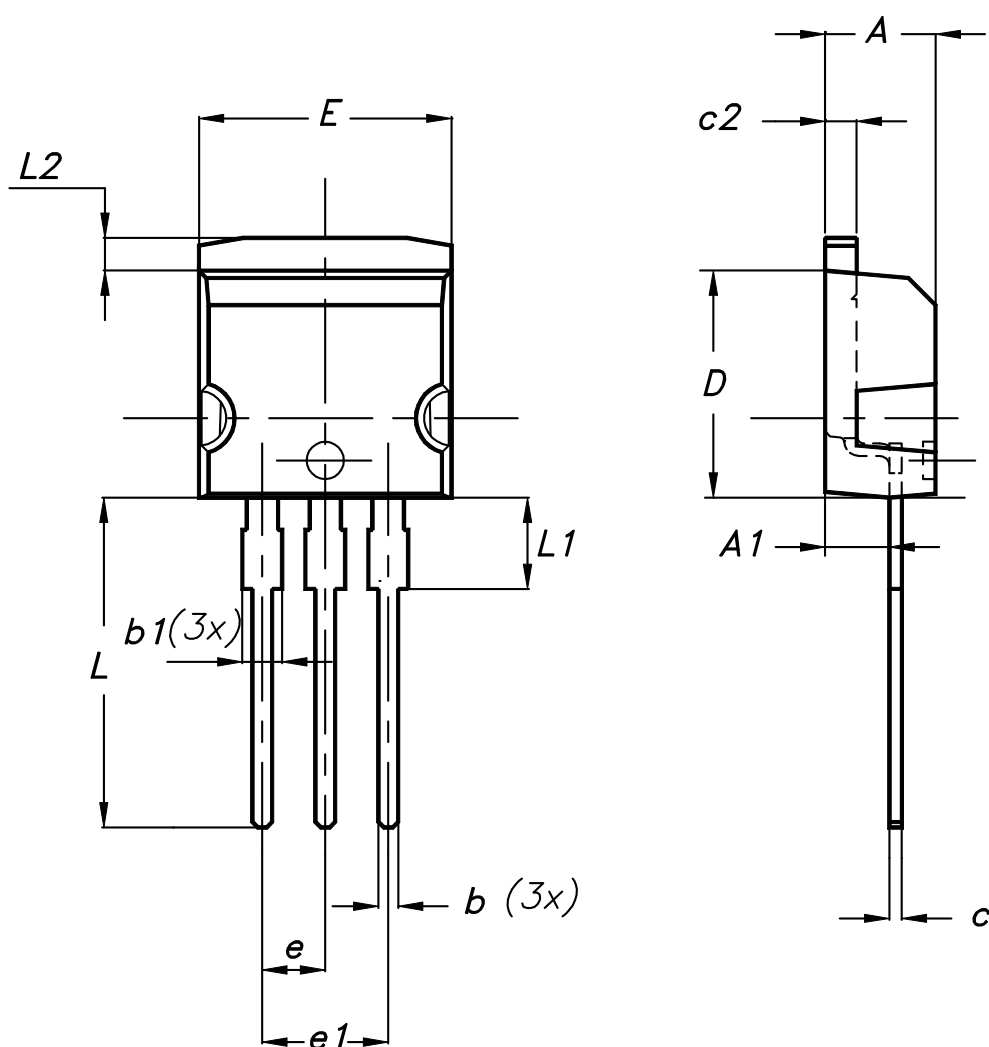
**Table 5. TO-220FPAB package mechanical data**

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.1739	0.1818
B	2.50	2.70	0.0988	0.1067
D	2.50	2.75	0.0988	0.1087
E	0.45	0.70	0.0178	0.0277
F	0.75	1.00	0.0296	0.0395
F1	1.15	1.70	0.0455	0.0672
F2	1.15	1.70	0.0455	0.0672
G	4.95	5.20	0.1957	0.2055
G1	2.40	2.70	0.0949	0.1067
H	10.00	10.40	0.3953	0.4111
L2	16.00 typ.		0.6324 typ.	
L3	28.60	30.60	1.1304	1.2095
L4	9.80	10.60	0.3874	0.4190
L5	2.90	3.60	0.1146	0.1423
L6	15.90	16.40	0.6285	0.6482
L7	9.00	9.30	0.3557	0.3676
Dia	3.00	3.20	0.1186	0.1265

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

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

Figure 12. I<sup>2</sup>PAK package outline





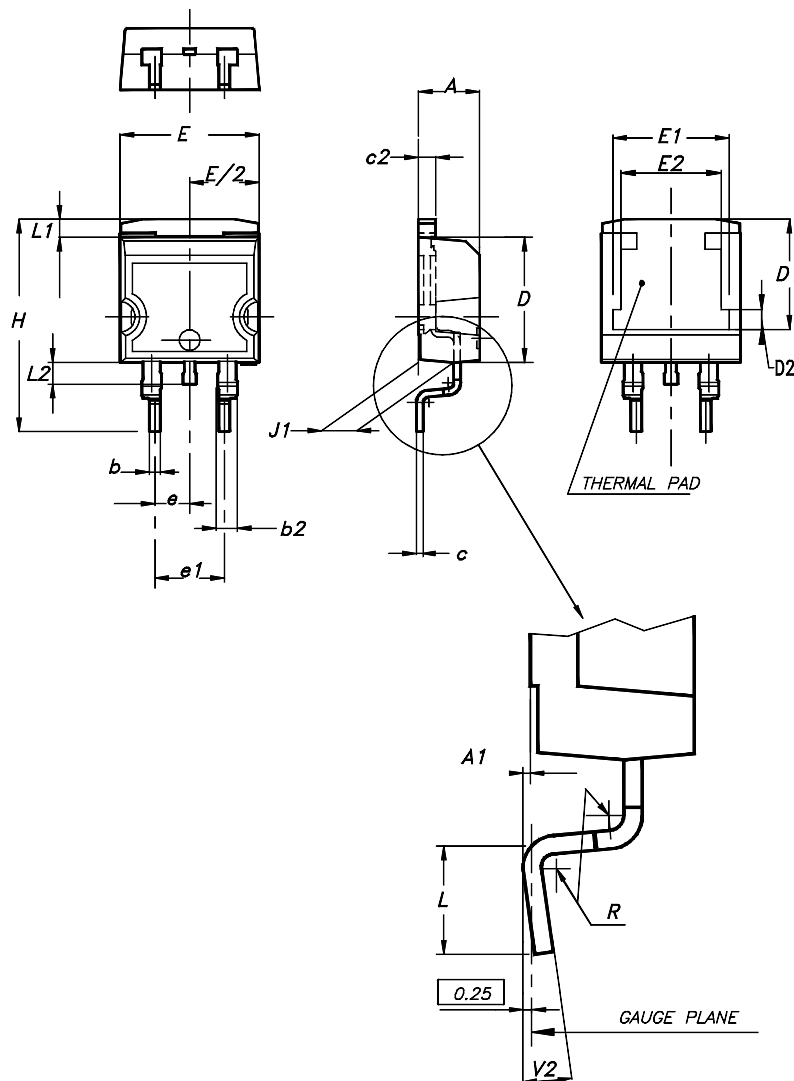
**Table 6.** I<sup>2</sup>PAK package mechanical data

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

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

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

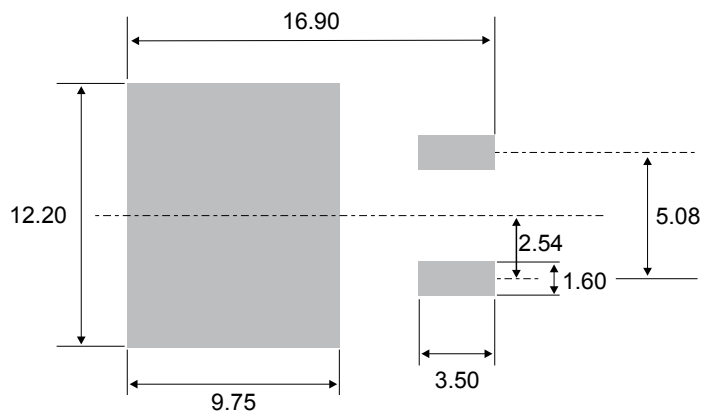
**Figure 13. D<sup>2</sup>PAK package outline**



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

**Table 7. 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 14. D<sup>2</sup>PAK recommended footprint (dimensions in mm)**


### 3 Ordering information

**Table 8. Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS20M100ST	PS20M100ST	TO-220AB	1.95 g	50	Tube
STPS20M100SFP	PS20M100SFP	TO-220FPAB	1.90 g	50	Tube
STPS20M100SR	PS20M100SR	I <sup>2</sup> PAK	1.50 g	50	Tube
STPS20M100SG-TR	PS20M100SG	D <sup>2</sup> PAK	1.48 g	1000	Tape and reel

## Revision history

**Table 9. Document revision history**

Date	Version	Changes
25-Mar-2009	1	First issue.
16-Apr-2010	2	Updated package graphic for TO-220AB on front page and in Table 5.
24-May-2016	3	Updated cover page. Complete Characteristics section update. Updated Section 2.4: "D <sup>2</sup> PAK package information" and Table 9: "Ordering information".
28-Sep-2018	4	Updated cover page, <a href="#">Table 1. Absolute ratings (limiting values with anode terminals short circuited, at 25 °C unless otherwise specified)</a> and <a href="#">Table 8. Ordering information</a> . Removed figure 1 and figure 11. Minor text changes to improve readability.
18-Feb-2019	5	Updated <a href="#">Table 1</a> .

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