

#### 1 Characteristics

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

Symbol	Parameter					Unit
V <sub>RRM</sub>	Repetitive peak reverse voltage		100	V		
I <sub>F(RMS)</sub>	Forward rms current				30	Α
	Average forward current $\delta$ = 0.5, square wave	TO-220AB, D <sup>2</sup> PAK, I <sup>2</sup> PAK	T <sub>C</sub> = 160 °C	Per diode	10	
				Per device	20	
I <sub>F(AV)</sub>		TO-220FPAB	T <sub>C</sub> = 145 °C	Per diode	10	Α
			T <sub>C</sub> = 125 °C	Per device	20	
I <sub>FSM</sub>	Surge non repetitive forward current tp = 10 ms sinusoidal				250	Α
P <sub>ARM</sub>	Repetitive peak avalanche power tp = 10 $\mu$ s, T <sub>j</sub> = 125 °C					W
T <sub>stg</sub>	Storage temperature range					°C
Tj	Maximum operating junction temperature (1)					°C

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

Table 2. Thermal resistance parameter

Symbol		Value	Unit		
		TO-220AB, D <sup>2</sup> PAK, I <sup>2</sup> PAK	Per diode	1.6	°C/W
D.,	Junction to case	TO-220FPAB	- Pei diode	4	
R <sub>th(j-c)</sub>		TO-220AB, D <sup>2</sup> PAK, I <sup>2</sup> PAK	Total	0.9	
		TO-220FPAB		3.2	
<b>D</b>	Coupling	TO-220AB, D <sup>2</sup> PAK, I <sup>2</sup> PAK		0.15	
$R_{th(c)}$		TO-220FPAB	-	2.5	

When the diodes 1 and 2 are used simultaneously:

 $\Delta Tj(diode\ 1) = P(diode\ 1)\ x\ R_{th(j-c)}(Per\ diode) + P(diode\ 2)\ x\ R_{th(c)}$ 

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.	Тур.	Max.	Unit
1 (1)	Reverse leakage current	T <sub>j</sub> = 25 °C	$V_R = V_{RRM}$	-		4.5	μA
I <sub>R</sub> <sup>(1)</sup>		T <sub>j</sub> = 125 °C		-	2	6	mA
	Forward voltage drop	T <sub>j</sub> = 25 °C	I <sub>F</sub> = 10 A	-		0.77	
V <sub>F</sub> <sup>(2)</sup>			I <sub>F</sub> = 20 A	-		0.88	V
		T <sub>j</sub> = 125 °C	I <sub>F</sub> = 10 A	-	0.59	0.64	V
			I <sub>F</sub> = 20 A	-	0.67	0.73	

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- 1. Pulse test:  $t_p$  = 5 ms,  $\delta$  < 2%
- 2. Pulse test:  $t_p$  = 380  $\mu$ s,  $\delta$  < 2%

To evaluate the conduction losses use the following equation:

$$P = 0.55 \times I_{F(AV)} + 0.009 I_{F}^{2}_{(RMS)}$$

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

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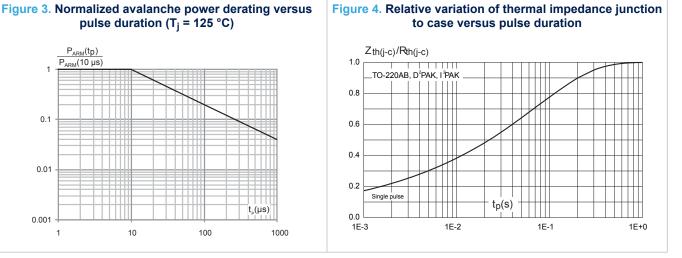


#### 1.1 Characteristics (curves)

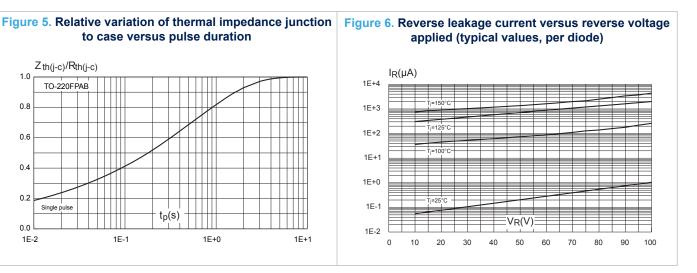
Figure 1. Average forward power dissipation versus average forward current (per diode)  $P_{F(AV)}(W)$ δ = 0.2 6 2  $I_{F(AV)}(A)$ δ=tp/1 0 6 10

Figure 2. Average forward current versus ambient temperature ( $\delta$  = 0.5, per diode)  $I_{F(AV)}(A)$ 12 TO-220AB 10 8 6 2 Tamb(°C) 0

pulse duration (T<sub>i</sub> = 125 °C)  $\frac{P_{ARM}(t_p)}{P_{ARM}(10 \ \mu s)}$ 0.1 0.01 t。(µs) 0.001 1000

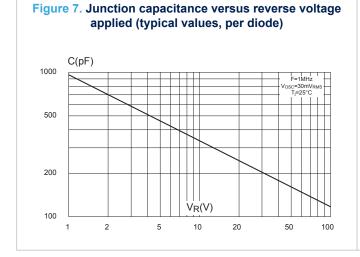


to case versus pulse duration  $Z_{th(j-c)}/R_{th(j-c)}$ TO-220FPAB 0.8 0.2 Single pu t<sub>p</sub>(s) 0.0 1E-1 1E+0 1E+1 1E-2



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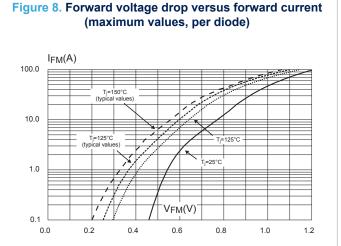
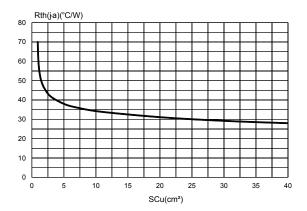


Figure 9. Thermal resistance junction to ambient versus copper surface under tab (epoxy printed board FR4,  $e_{Cu}$  = 35  $\mu$ m) (D<sup>2</sup>PAK)



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## 2 Package information

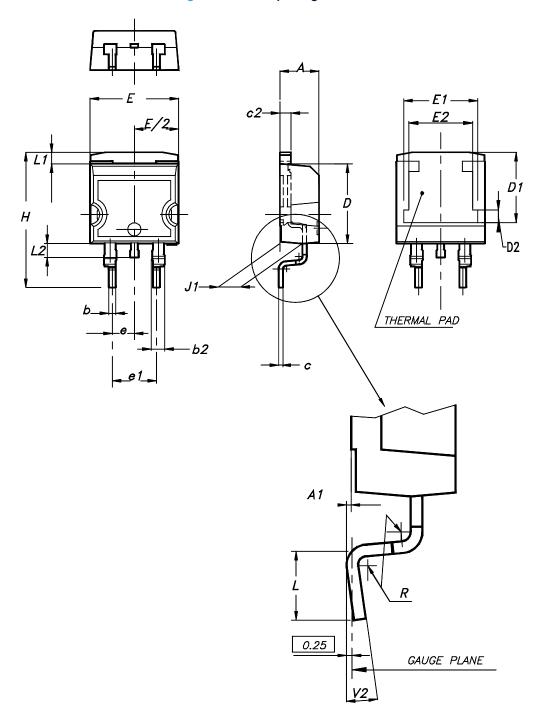
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions and product status are available at: <a href="https://www.st.com">www.st.com</a>. ECOPACK is an ST trademark.

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

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

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



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Table 4. D<sup>2</sup>PAK package mechanical data

	Dimensions					
Ref.	Millim	eters	Inch	ies		
	Min.	Max.	Min.	Max.		
А	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		
С	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		
е	2.54	typ.	0.100			
e1	4.88	5.28	0.190	0.205		
Н	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°		



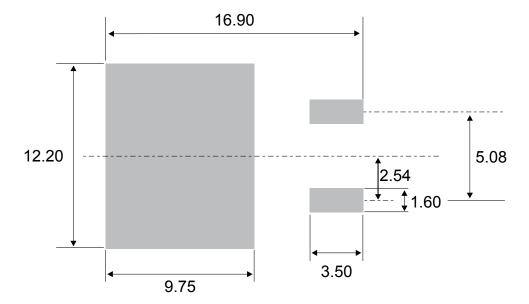


Figure 11. D<sup>2</sup>PAK Recommended footprint

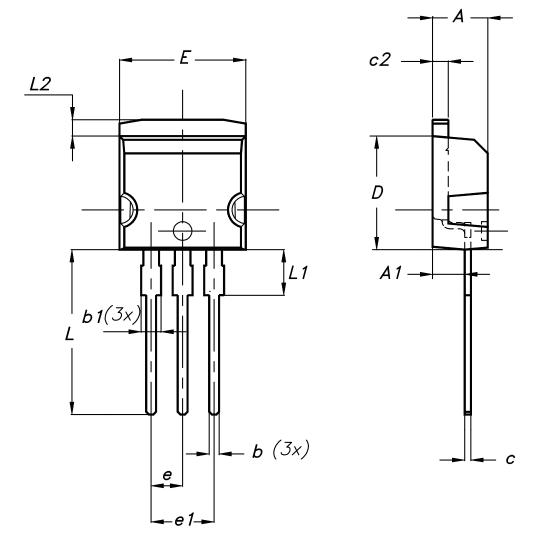
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### 2.2 I<sup>2</sup>PAK package information

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

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



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

	Dimensions					
Ref.	Millimeters		Inches (for re	ference only)		
	Min.	Max.	Min.	Max.		
Α	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		
С	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		
е	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		

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### 2.3 TO-220AB package information

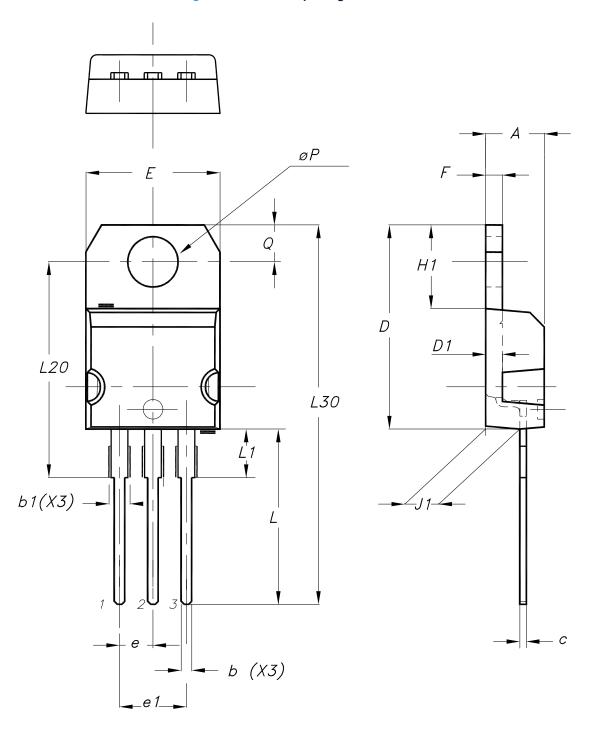
Cooling method: by conduction (C)

• Epoxy meets UL 94,V0

• Recommended torque value: 0.55 N·m

• Maximum torque value: 0.7 N·m

Figure 13. TO-220AB package outline



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Table 6. TO-220AB package mechanical data

	Dimensions					
Ref.	Millimeters		Incl	nes		
	Min.	Max.	Min.	Max.		
А	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		
С	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		
е	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.			
θР	3.75	3.85	0.148	0.152		
Q	2.65	2.95	0.104	0.116		

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### 2.4 TO-220FPAB package information

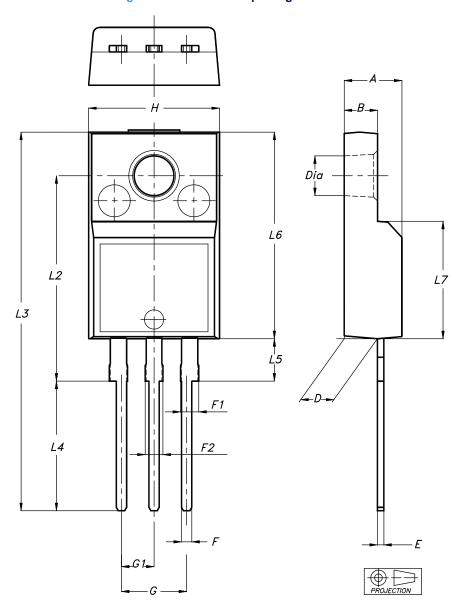
Epoxy meets UL 94,V0

Cooling method: by conduction (C)

• Recommended torque value: 0.55 N·m

Maximum torque value: 0.70 N·m

Figure 14. TO-220FPAB package outline



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Table 7. TO-220FPAB package mechanical data

	Dimensions					
Ref.	Millin	neters	Inches (for reference only)			
	Min.	Max.	Min.	Max.		
А	4.40	4.60	0.1739	0.1818		
В	2.50	2.70	0.0988	0.1067		
D	2.50	2.75	0.0988	0.1087		
Е	0.45	0.70	0.0178	0.0277		
F	0.75	1.00	0.0296	0.0395		
F1	F1 1.15 1.70		0.0455	0.0672		
F2	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		
Н	10.00	10.40	0.3953	0.4111		
L2	16.00	0 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		

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# **3** Ordering information

**Table 8. Ordering information** 

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS20H100CT	STPS20H100CT	TO-220AB	1.95 g	50	Tube
STPS20H100CFP	STPS20H100CFP	TO-220FPAB	1.90 g	50	Tube
STPS20H100CR	STPS20H100CR	I <sup>2</sup> PAK	1.50 g	50	Tube
STPS20H100CG	STPS20H100CG	D <sup>2</sup> PAK	1.48 g	50	Tube
STPS20H100CG-TR	STPS20H100CG	D <sup>2</sup> PAK	1.48 g	1000	Tape and reel

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## **Revision history**

Table 9. Document revision history

Date	Revision	Changes	
Jul-2003	4G	Previous release	
21-Mar-2007	5	Removed ISOWATT package	
10-Sep-2007	6	Reformatted cover page to current standards - no technical changes. Updated dimensions A1, b, b1, c, c2, L, and L1 in Table 8.	
22-Sep-2011	7	Updated Table 8.	
21-May-2015	8	Updated features, and packages silhouette in cover page. Updated Section 1: "Characteristics" and Section 1.1: "Characteristics (curves)". Updated Section 2.2: "D²PAK package information".	
16-Apr-2018	9	Updated I <sup>2</sup> PAK package mechanical data.	
20-Jan-2020	10	Updated Section 1 Characteristics and Table 8. Ordering information. Added Section Applications.	



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