

1 Characteristics

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

Symbol	Parameter					Unit
V _{RRM}	Repetitive peak reverse voltage					٧
I _{F(RMS)}	Forward rms current				30	Α
		TO-220AB, D ² PAK, I ² PAK	T _C = 155 °C	Per diode	40	
I _{F(AV)}	Average forward current δ = 0.5, square wave	TO-220FPAB	T _C = 135 °C	Per diode	10	Α
		All types Per device			20	
I _{FSM}	Surge non repetitive forward current	tp = 10 ms sinusoidal			180	Α
P _{ARM}	Repetitive peak avalanche power tp = 10 μ s, T_j = 125 °C				480	W
T _{stg}	Storage temperature range					°C
Tj	Maximum operating junction temperature (1)					°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 parameter

Symbol		Value	Unit		
		TO-220AB, D ² PAK, I ² PAK	Per diode	2.2	°C/W
Du a	Junction to case	TO-220FPAB	Fel diode	4.5	
$R_{th(j-c)}$		TO-220AB, D ² PAK, I ² PAK	Total	1.3	
		TO-220FPAB	Iotal	3.5	
R _{th(c)}	Coupling	TO-220AB, D ² PAK, I ² PAK		0.3	
		TO-220FPAB	-	2.5	

When the diodes 1 and 2 are used simultaneously:

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

Table 3. Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Тур.	Max.	Unit
I _R ⁽¹⁾	Reverse leakage current	T _j = 25 °C	$V_R = V_{RRM}$	-		5.0	μΑ
		T _j = 125 °C		-		5.0	mA
V _F ⁽²⁾	Forward voltage drop	T _j = 25 °C	I _F = 10 A	-		0.92	
				-	0.69	0.75	V
			I _F = 20A	-		1.0	V
				-	0.79	0.86	

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

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

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



1.1 Characteristics (curves)

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

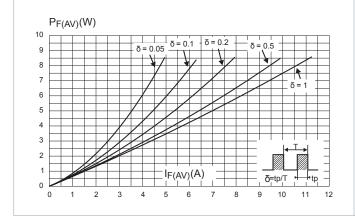


Figure 2. Average forward current versus ambient temperature (δ = 0.5, per diode)

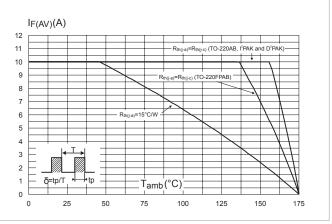


Figure 3. Normalized avalanche power derating versus pulse (T_j= 125 °C)

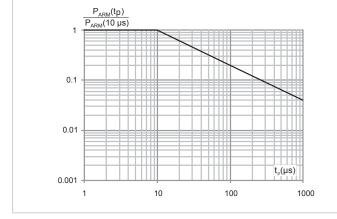


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration (per diode)

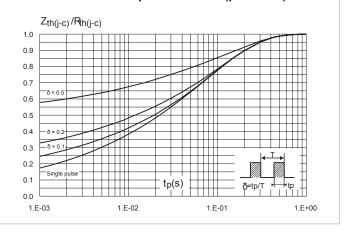


Figure 5. Relative variation of thermal impedance junction to case versus pulse duration (per diode)

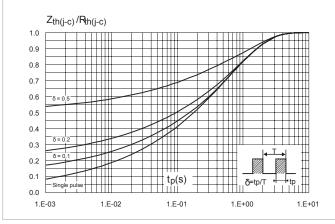
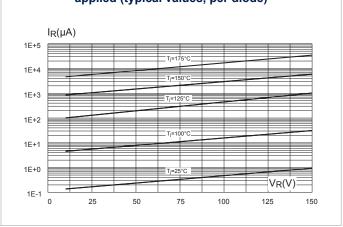


Figure 6. Reverse leakage current versus reverse voltage applied (typical values, per diode)



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Figure 7. Junction capacitance versus reverse voltage applied (typical values, per diode)

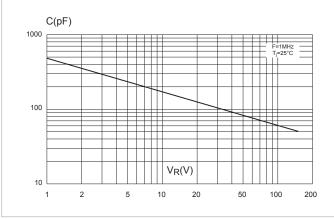


Figure 8. Forward voltage drop versus forward current (maximum values, per diode)

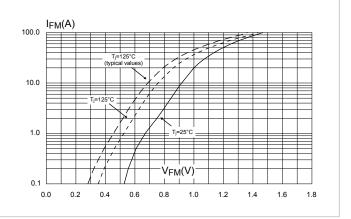
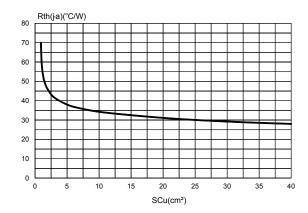


Figure 9. Thermal resistance junction to ambient versus copper surface under tab (epoxy printed board FR4, e_{Cu} = 35 μ m) (D²PAK)



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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: www.st.com. ECOPACK® is an ST trademark.

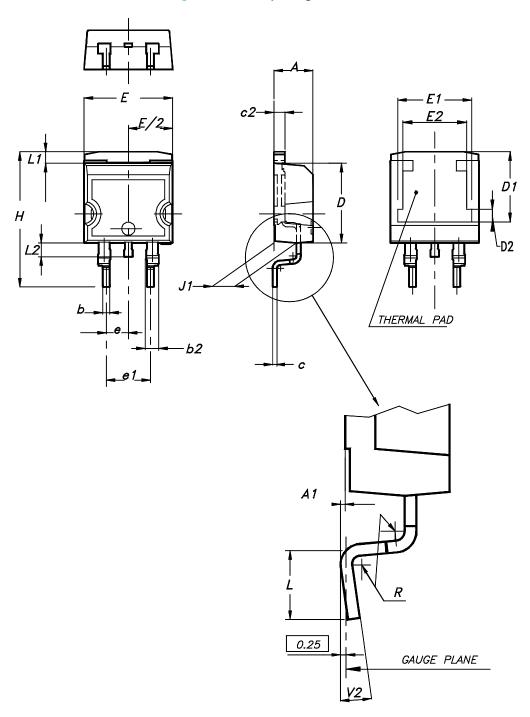
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2.1 D²PAK package information

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

Figure 10. D²PAK package outline



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Table 4. D²PAK package mechanical data

	Dimensions					
Ref.	Millim	neters	Inches			
	Min.	Max.	Min.	Max.		
Α	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°		8°		



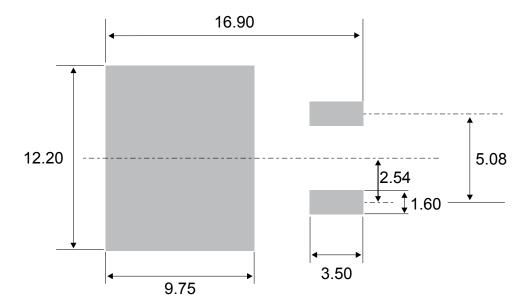


Figure 11. D²PAK Recommended footprint

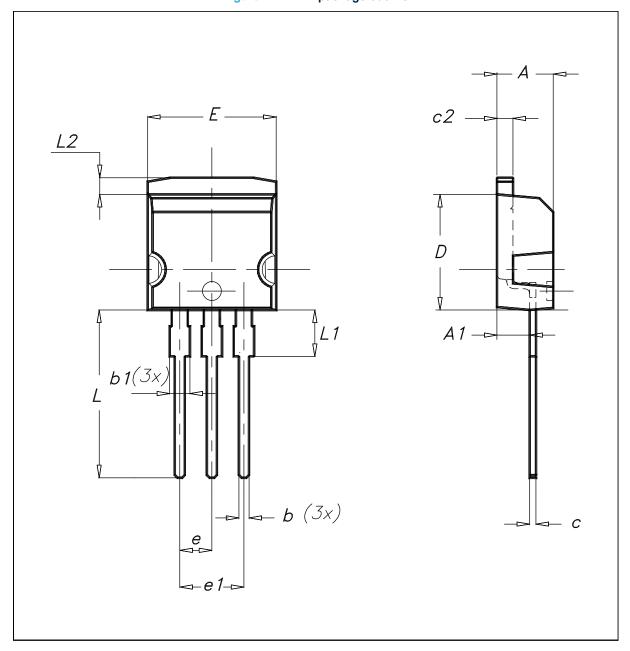
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2.2 I²PAK package information

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

Figure 12. I²PAK package outline



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Table 5. I²PAK package mechanical data

	Dimensions					
Ref.	Millim	neters	Inches			
	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

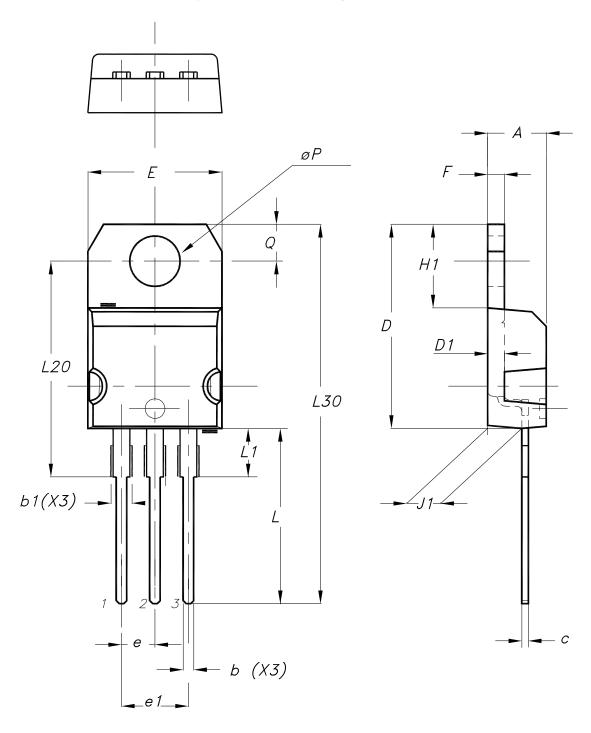
• Cooling method: by conduction (C)

• 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.	Millim	neters	Inches			
	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

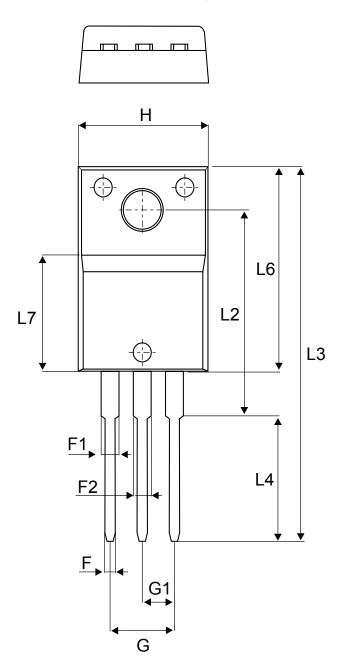
• Cooling method: by conduction (C)

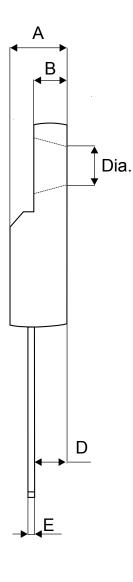
• Epoxy meets UL 94,V0

Recommended torque value: 0.55 N·m

• Maximum torque value: 0.7 N·m

Figure 14. TO-220FPAB package outline





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Table 7. TO-220FPAB package mechanical data

	Dimensions					
Ref.	Millimeters		Inches (for re	ference only)		
	Min.	Max.	Min.	Max.		
Α	4.40	4.60	0.1739	0.1818		
В	2.5	2.7	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	1.0	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		
Н	10.00	10.40	0.3953	0.4111		
L2	16.00	0 typ.	0.632	4 typ.		
L3	28.60	30.60	1.1304	1.2095		
L4	9.80	10.6	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	3.0	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
STPS20150CT	STPS20150CT	TO-220AB	1.95 g	50	Tube
STPS20150CFP	STPS20150CFP	TO-220FPAB	1.9 g	50	Tube
STPS20150CR	STPS20150CR	I ² PAK	1.5 g	50	Tube
STPS20150CG-TR	STPS20150CG	D ² PAK	1.38 g	1000	Tape and reel
STPS20150CG	STPS20150CG	D ² PAK	1.38 g	50	Tube



Revision history

Table 9. Document revision history

Date	Revision	Changes
Jul-2003	6D	Last update
11-May-2006	7	Reformatted to current standard. Added ECOPACK statement.
		Changed nF to pF in Figure 10.
07-Mar-2007	8	Reworked footnote to Table 1. Corrected typing error in Table 3.
28-Jan-2011	9	Updated weight in Table 9. Added warning paragraph above Table 6.
24-Aug-2015	10	Updated features, Table 1: "Device summary" and packages silhouette in cover page.
		Updated Section 1: "Characteristics" and Section 1.1: "Characteristics(curves)".
		Updated Section 2.2: "D²PAK package information".
08-Fev-2018	11	Updated I ² PAK package information.
10-Apr-2018	12	Updated Table 5. I ² PAK package mechanical data.



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