1 Characteristics

Table 1. Absolute ratings (limiting values, per diode)

Symbol	Parameter				Value	Unit
V_{RRM}	Repetitive peak reverse voltage				45	V
$I_{F(RMS)}$	RMS forward voltage				20	A
$I_{F(AV)}$	Average forward current	TO-220AB / D^2PAK / I^2PAK	Tc =135° C δ = 0.5	Per diode Per device	5 10	A
		TO-220FPAB	T_c = 140° C δ = 0.5	Per diode Per device	5 10	A
I_{FSM}	Surge non repetitive forward current		t_p = 10 ms sinusoidal		150	A
I_{RRM}	Repetitive peak reverse current		t_p = 2 µs square F = 1 kHz		1	A
I_{RSM}	Non repetitive peak reverse current		t_p = 100 µs square		2	A
P_{ARM}	Repetitive peak avalanche power		t_p = 1 µs Tj = 25°C		2700	W
T_{stg}	Storage temperature range				-65 to + 150	° C
T_j	Maximum operating junction temperature (1)				150	° C
dV/dt	Critical rate of rise of reverse voltage				10000	V/µs

1. $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ condition to avoid thermal runaway for a diode on its own heatsink

Table 2. Thermal resistances

Symbol	Parameter			Value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AB / D^2PAK / I^2PAK	Per diode Total	3 1.7	°C/W
$R_{th\ (c)}$			Coupling	0.35	
$R_{th(j-c)}$	Junction to case	TO-220FPAB	Per diode Total	5 3.8	°C/W
$R_{th\ (c)}$			Coupling	2.5	

When the diodes 1 and 2 are used simultaneously :
ΔTj(diode 1) = P(diode1) 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.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25° C	$V_R = V_{RRM}$			0.15	mA
		T_j = 100° C			45	90	mA
V_F(1)	Forward voltage drop	T_j = 25° C	I_F = 5 A			0.53	V
		T_j = 125° C	I_F = 5 A		0.36	0.46	
		T_j = 25° C	I_F = 10 A			0.67	
		T_j = 125° C	I_F = 10 A		0.49	0.59	

1. Pulse test: tp = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation:
$P = 0.33 \times I_{F(AV)} + 0.026\ I_F{}^2{}_{(RMS)}$

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

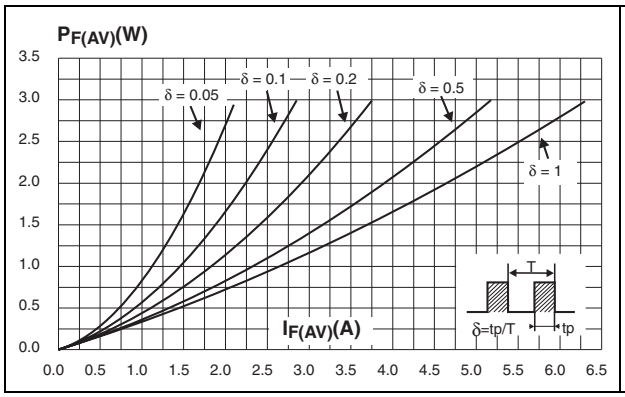


Figure 2. Average forward current versus ambient temperature (δ = 0.5, per diode)

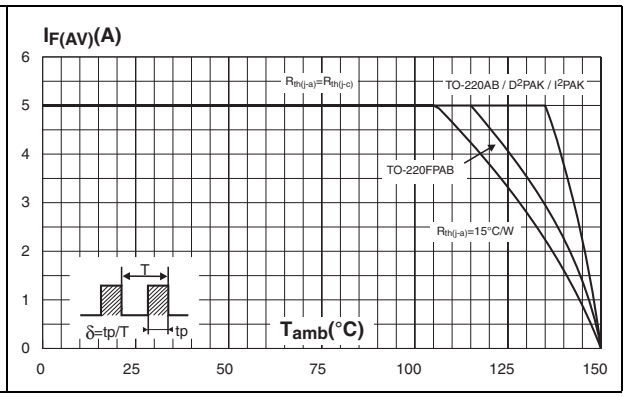


Figure 3. Normalized avalanche power derating versus pulse duration

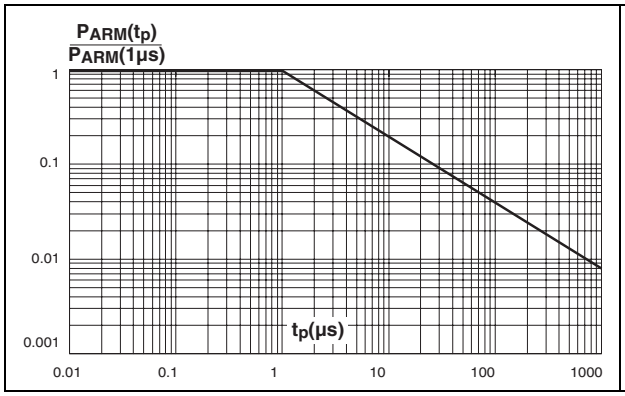


Figure 4. Normalized avalanche power derating versus junction temperature

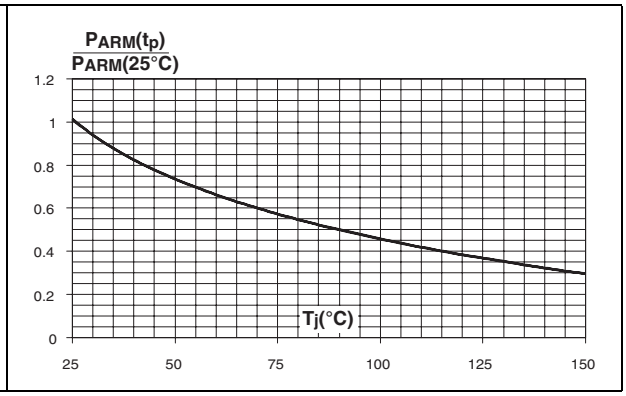


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values, per diode) (TO-220AB, I²PAK and D²PAK)

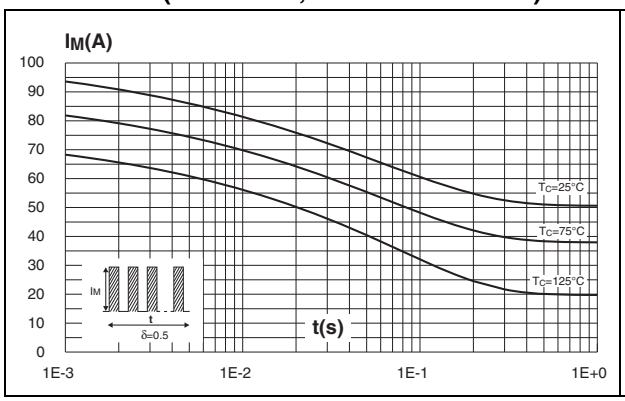


Figure 6. Non repetitive surge peak forward current versus overload duration (maximum values, per diode) (TO-220FPAB)

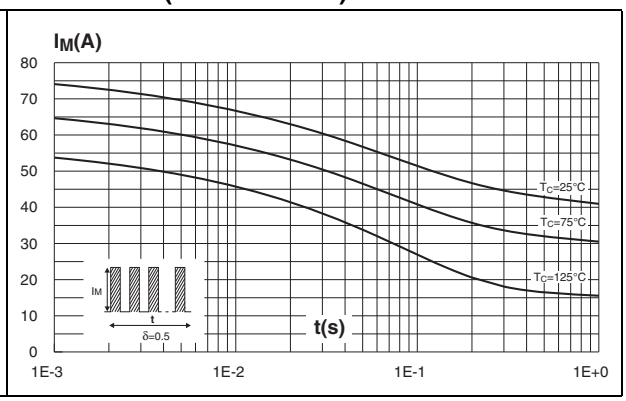


Figure 7. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB, I²PAK and D²PAK)

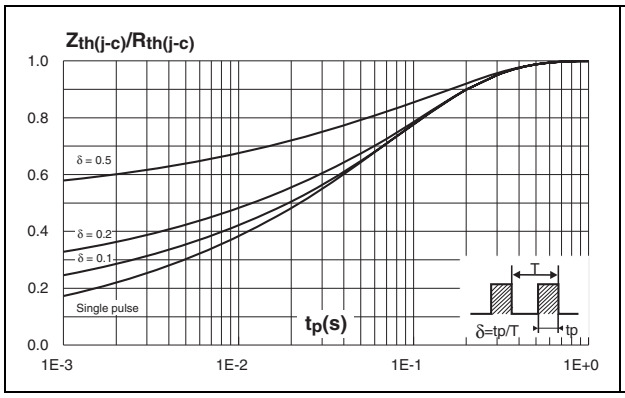


Figure 8. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

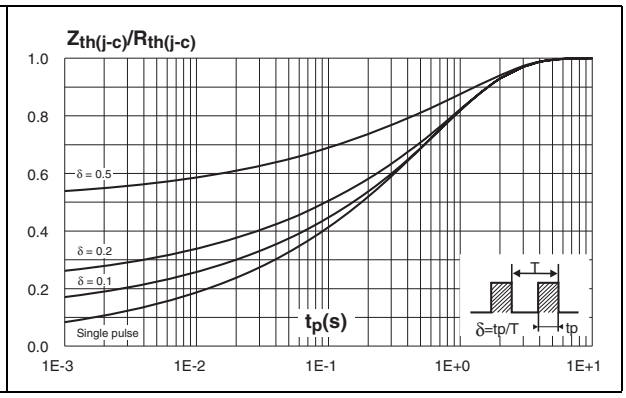


Figure 9. Reverse leakage current versus reverse voltage applied (typical values, per diode)

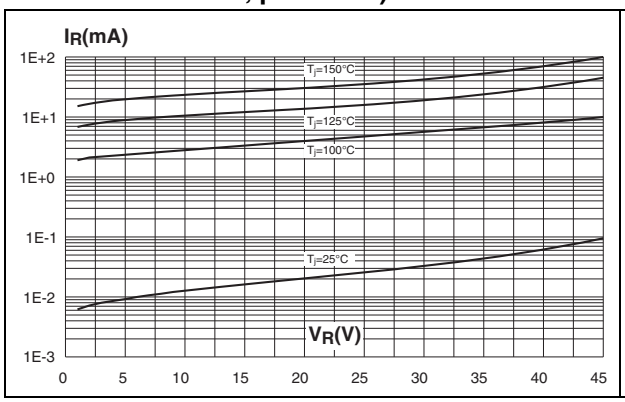


Figure 10. Junction capacitance versus reverse voltage applied (typical values, per diode)

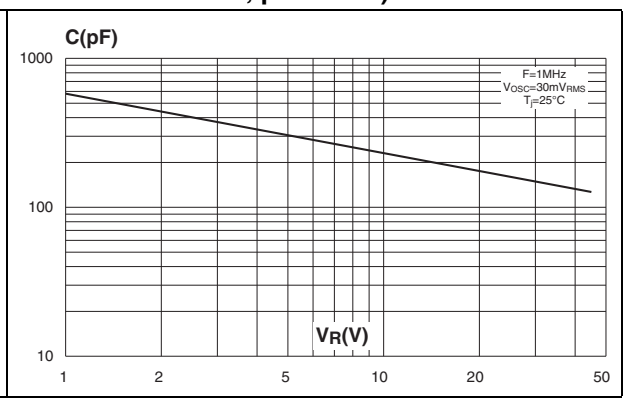


Figure 11. Forward voltage drop versus forward current (maximum values, per diode)

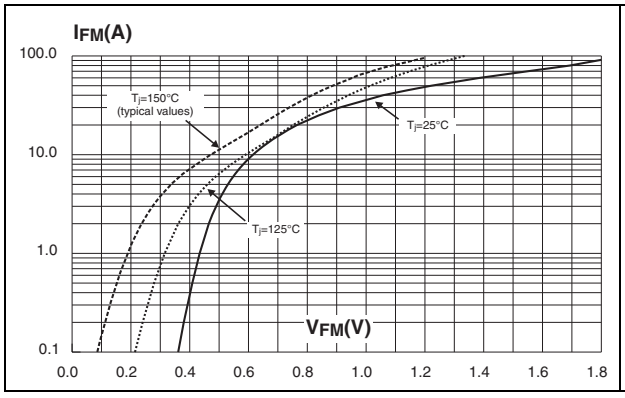
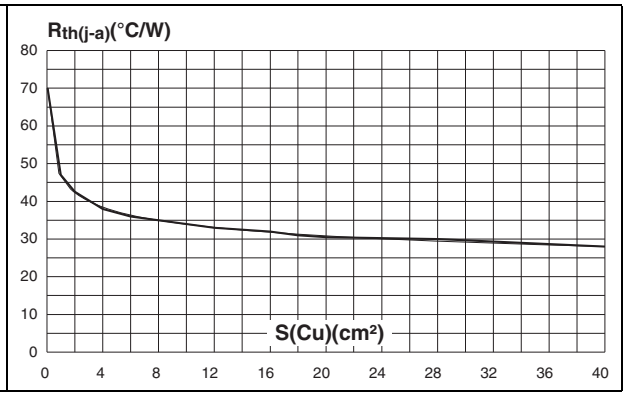


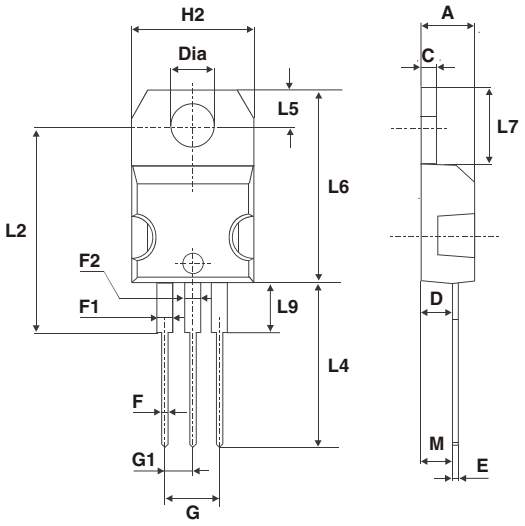
Figure 12. Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board FR4, copper thickness: 35 µm) (D²PAK)



2 Package Information

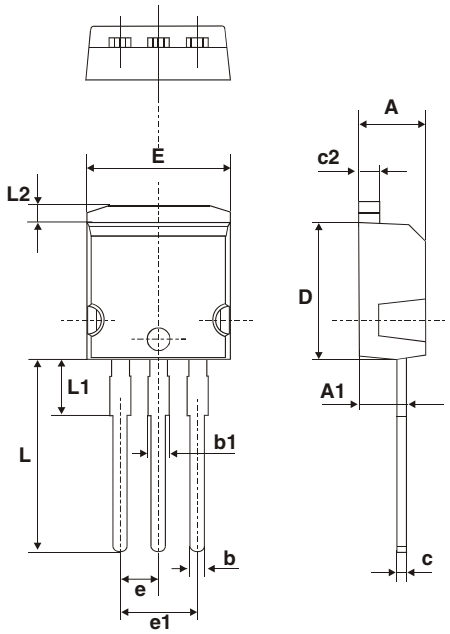
- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 Nm
- Maximum torque value: 0.70 Nm

Table 4. TO-220AB dimensions



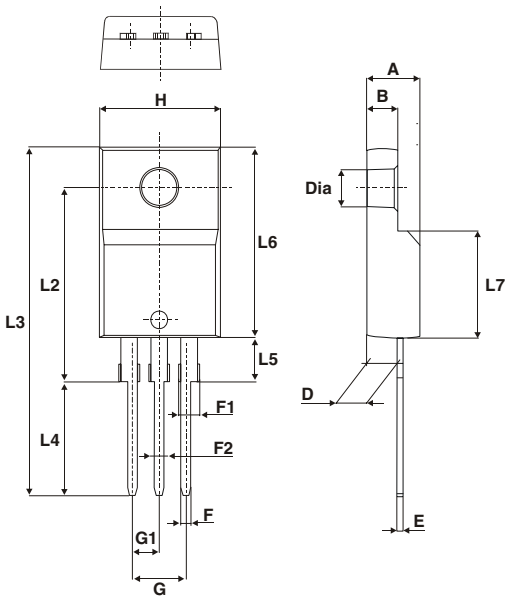
Ref	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
F2	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
G1	2.40	2.70	0.094	0.106
H2	10	10.40	0.393	0.409
L2	16.4 typ.		0.645 typ.	
L4	13	14	0.511	0.551
L5	2.65	2.95	0.104	0.116
L6	15.25	15.75	0.600	0.620
L7	6.20	6.60	0.244	0.259
L9	3.50	3.93	0.137	0.154
M	2.6 typ.		0.102 typ.	
Diam.	3.75	3.85	0.147	0.151

Table 5. I^2PAK dimensions



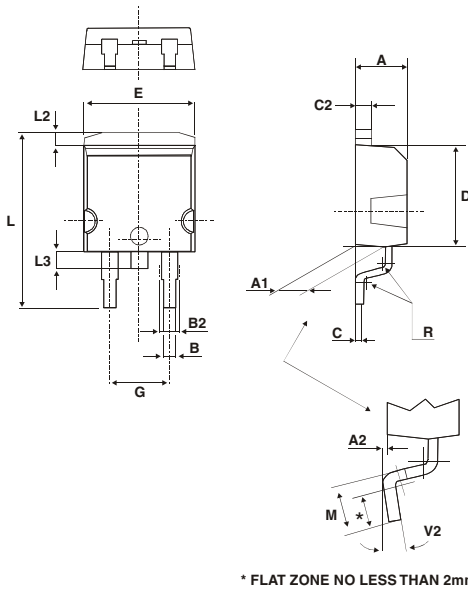
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.40	2.72	0.094	0.107
b	0.61	0.88	0.024	0.035
b1	1.14	1.70	0.044	0.067
c	0.49	0.70	0.019	0.028
c2	1.23	1.32	0.048	0.052
D	8.95	9.35	0.352	0.368
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
E	10	10.40	0.394	0.409
L	13	14	0.512	0.551
L1	3.50	3.93	0.138	0.155
L2	1.27	1.40	0.050	0.055

Table 6. TO-220FPAB dimensions



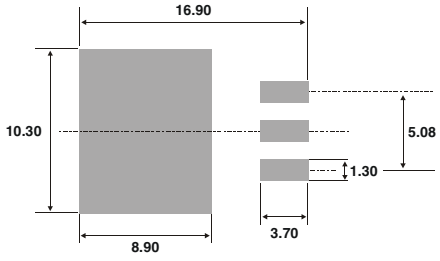
Ref	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.4	4.6	0.173	0.181
B	2.5	2.7	0.098	0.106
D	2.5	2.75	0.098	0.108
E	0.45	0.70	0.018	0.027
F	0.75	1	0.030	0.039
F1	1.15	1.70	0.045	0.067
F2	1.15	1.70	0.045	0.067
G	4.95	5.20	0.195	0.205
G1	2.4	2.7	0.094	0.106
H	10	10.4	0.393	0.409
L2	16 Typ.		0.63 Typ.	
L3	28.6	30.6	1.126	1.205
L4	9.8	10.6	0.386	0.417
L5	2.9	3.6	0.114	0.142
L6	15.9	16.4	0.626	0.646
L7	9.00	9.30	0.354	0.366
Dia.	3.00	3.20	0.118	0.126

Table 7. D²PAK dimensions



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
A2	0.03	0.23	0.001	0.009
B	0.70	0.93	0.027	0.037
B2	1.14	1.70	0.045	0.067
C	0.45	0.60	0.017	0.024
C2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
E	10.00	10.40	0.393	0.409
G	4.88	5.28	0.192	0.208
L	15.00	15.85	0.590	0.624
L2	1.27	1.40	0.050	0.055
L3	1.40	1.75	0.055	0.069
M	2.40	3.20	0.094	0.126
R	0.40 typ.		0.016 typ.	
V2	0°	8°	0°	8°

Figure 13. Footprint (dimensions in millimeters)



In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

3 Ordering information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STPS10L45CT	STPS10L45CT	TO-220AB	2.23 g	50	Tube
STPS10L45CFP	STPS10L45CFP	TO-200FPAB	2 g	50	Tube
STPS10L45CG	STPS10L45CG	D^2PAK	1.48 g	50	Tube
STPS10L45CG-TR	STPS10L45CG	D^2PAK	1.48 g	1000	Tape and reel
STPS10L45CR	STPS10L45CR	I^2PAK	1.49 g	50	Tube

4 Revision history

Date	Revision	Description of Changes
Jul-2003	3B	Last release.
22-Mar-2007	4	Removed ISOWATT package. Added I^2PAK package.

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