1 Characteristics

Table 1. Absolute Ratings (limiting values)

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 $\delta = 0.5$	TO-220AC / D^2PAK	T_c = 160° C	7.5	A
		TO-220FPAC	T_c = 145° C		
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 T_j = 25° C		2700	W
T_{stg}	Storage temperature range			-65 to + 175	°C
T_j	Maximum operating junction temperature (1)			175	°C
dV/dt	Critical rate of rise of reverse voltage			10000	V/µs

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

Table 2. Thermal resistances

Symbol	Parameter		Value	Unit
$R_{th\ (j-c)}$	Junction to case	TO-220AC / D^2PAK	3.0	°C/W
		TO-220FPAC	5.5	

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	$V_R = V_{RRM}$			100	µA
		T_j = 125° C			5	15	mA
V_F(1)	Forward voltage drop	T_j = 125° C	I_F = 7.5 A		0.5	0.57	V
		T_j = 25° C	I_F = 15 A			0.84	
		T_j = 125° C	I_F = 15 A		0.65	0.72	

1. Pulse test: tp = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation:
$P = 0.42 \times I_{F(AV)} + 0.020\ I_F{}^2{}_{(RMS)}$

Figure 1. Average forward power dissipation versus average forward current

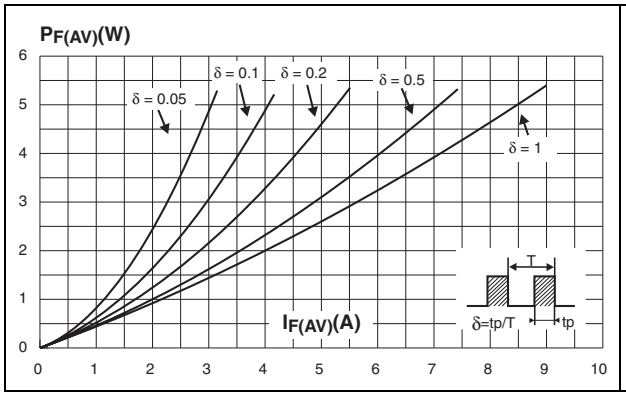


Figure 2. Average forward current versus ambient temperature (δ = 0.5)

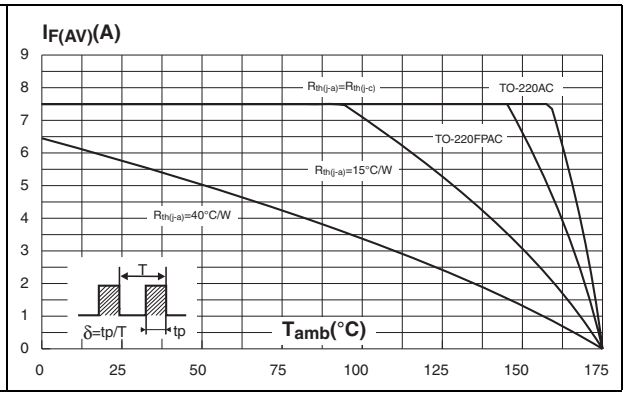


Figure 3. Normalized avalanche power derating versus pulse duration

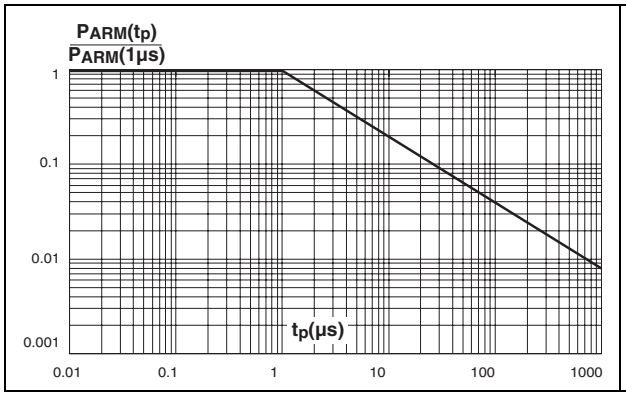


Figure 4. Normalized avalanche power derating versus junction temperature

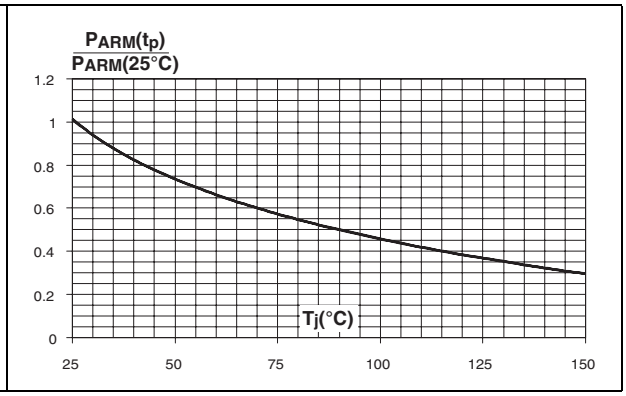


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values) (TO-220AC and D²PAK)

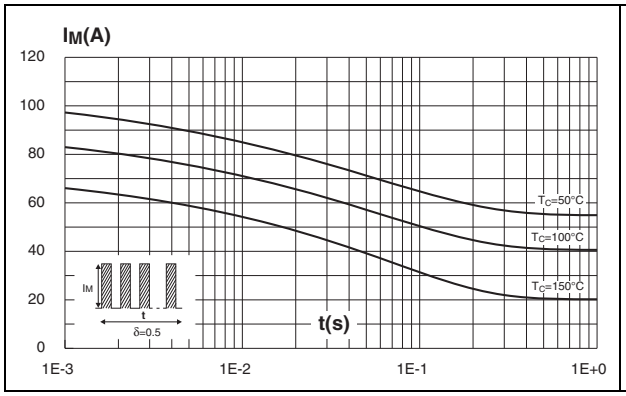


Figure 6. Non repetitive surge peak forwardcurrent versus overload duration (maximum values) (TO-220FPAC)

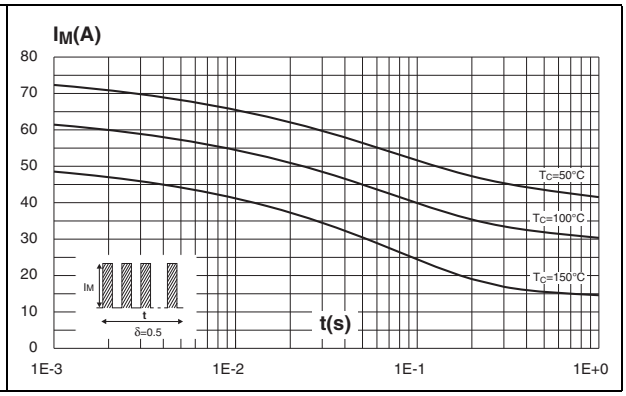


Figure 7. Relative variation of thermal transient impedance junction to case versus pulse duration (TO-220AC and D^2PAK)

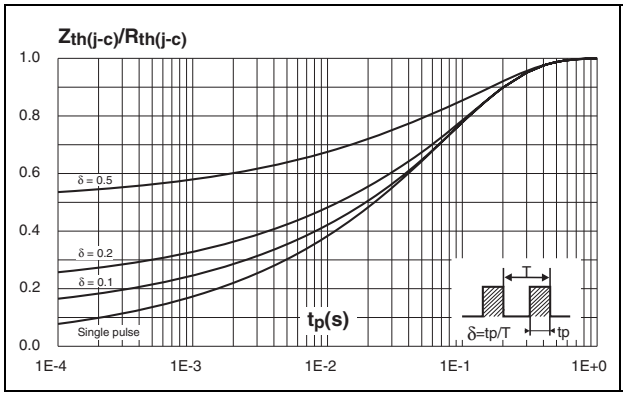


Figure 8. Relative variation of thermal transient impedance junction to case versus pulse duration (TO-220FPAC)

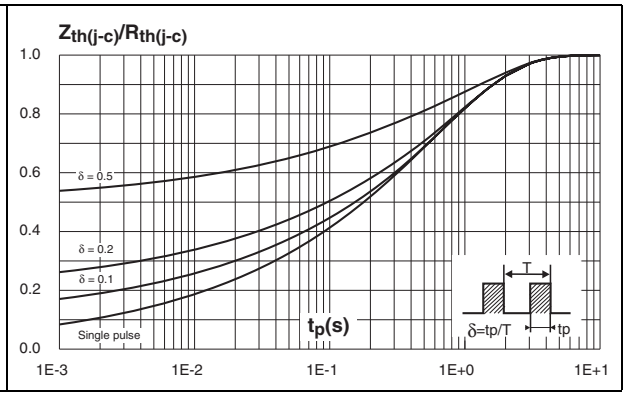


Figure 9. Reverse leakage current versus reverse voltage applied (typical values)

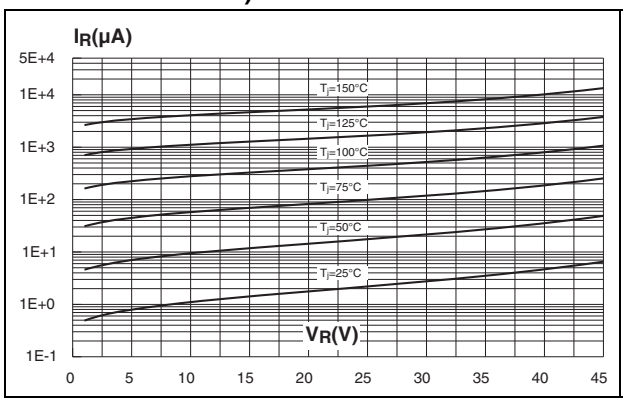


Figure 10. Junction capacitance versus reverse voltage applied (typical values)

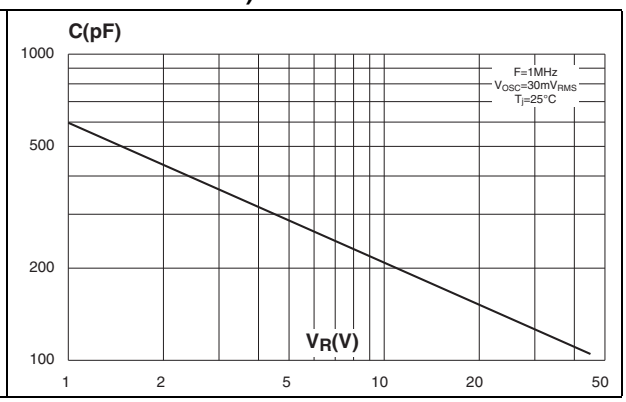


Figure 11. Forward voltage drop versus forward current (maximum values)

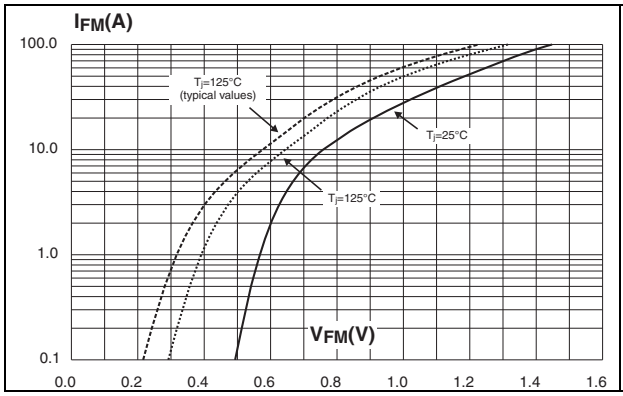
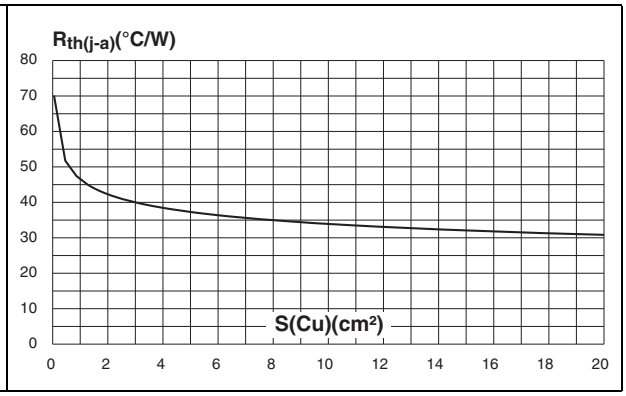


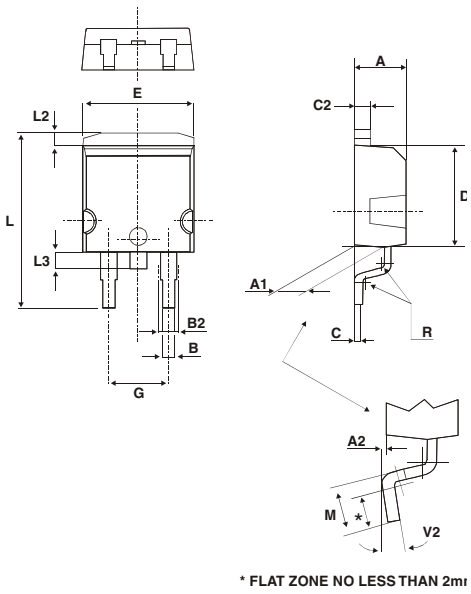
Figure 12. Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board, copper thickness: 35 µm)



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. 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)

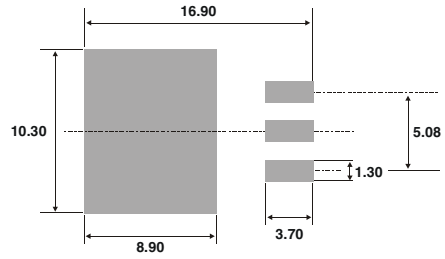
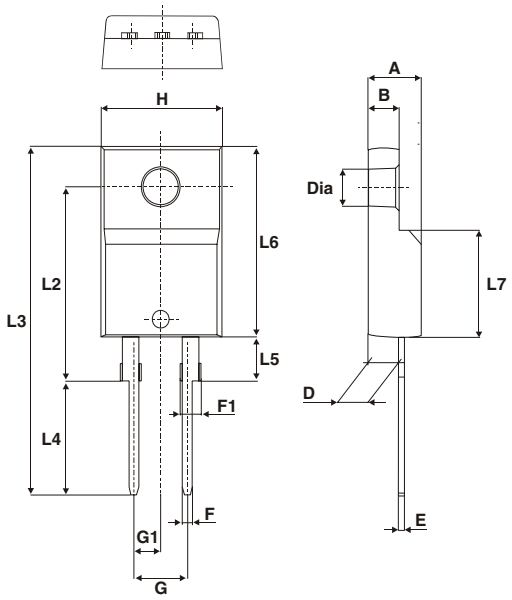
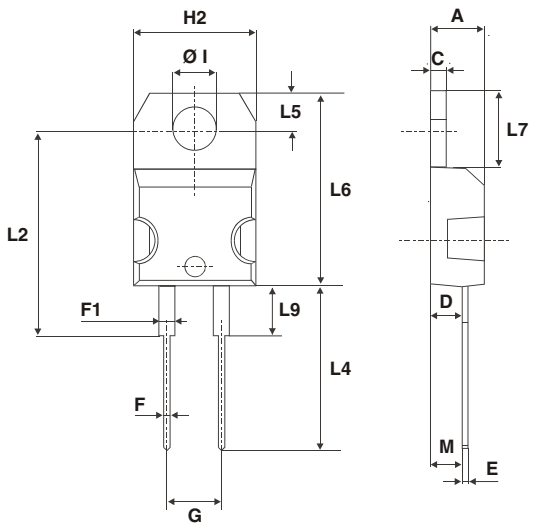


Table 5. TO-220FPAC dimensions



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
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	0.126	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 6. TO-220AC 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

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
STPS745D	STPS745D	TO-220AC	1.86 g	50	Tube
STPS745G	STPS745G	D^2PAK	1.48 g	50	Tube
STPS745G-TR	STPS745G	D^2PAK	1.48 g	1000	Tape & reel
STPS745FP	STPS745FP	TO-220FPAC	1.9 g	50	Tube

4 Revision history

Date	Revision	Description of Changes
Jul-2003	6G	Last release.
22-Mar-2007	7	Removed ISOWATT package.

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