

Power Schottky rectifier

Main product characteristics

$I_{F(AV)}$	7.5 A
V_{RRM}	45 V
T_j (max)	150° C
V_F (max)	0.57 V

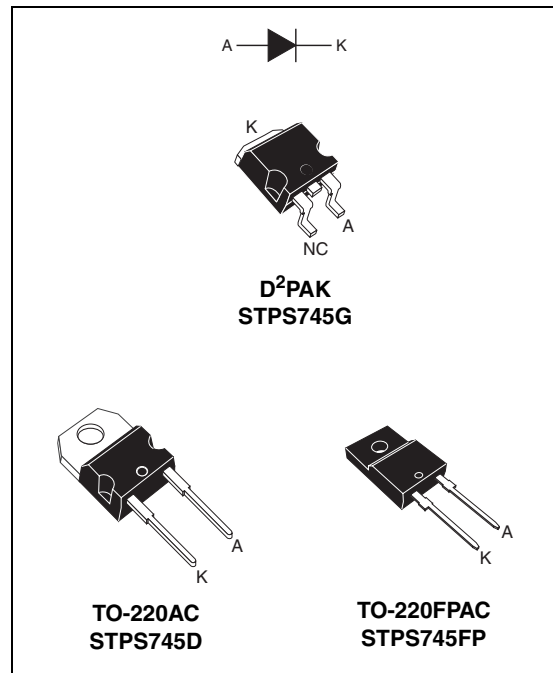
Features and Benefits

- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Insulated package: TO-220FPAC
Insulating voltage = 2000 V DC
Capacitance = 12 pF
- Avalanche capability specified

Description

Single Schottky rectifier suited for Switch Mode Power Supply and high frequency DC to DC converters.

Packaged either in TO-220AC, TO-220FPAC or D²PAK, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



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 ² PAK	$T_c = 160^\circ\text{C}$	7.5	A
		TO-220FPAC	$T_c = 145^\circ\text{C}$		
I_{FSM}	Surge non repetitive forward current	$t_p = 10\text{ ms}$ Sinusoidal	150	A	
I_{RRM}	Repetitive peak reverse current	$t_p = 2\ \mu\text{s}$ square F = 1 kHz	1	A	
I_{RSM}	Non repetitive peak reverse current	$t_p = 100\ \mu\text{s}$ square	2	A	
P_{ARM}	Repetitive peak avalanche power	$t_p = 1\ \mu\text{s}$ $T_j = 25^\circ\text{C}$	2700	W	
T_{stg}	Storage temperature range		-65 to +175	$^\circ\text{C}$	
T_j	Maximum operating junction temperature ⁽¹⁾		175	$^\circ\text{C}$	
dV/dt	Critical rate of rise of reverse voltage		10000	V/ μs	

1. $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$ 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 ² PAK	3.0	$^\circ\text{C/W}$
		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	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			100	μA
		$T_j = 125^\circ\text{C}$			5	15	mA
$V_F^{(1)}$	Forward voltage drop	$T_j = 125^\circ\text{C}$	$I_F = 7.5\text{ A}$		0.5	0.57	V
		$T_j = 25^\circ\text{C}$	$I_F = 15\text{ A}$			0.84	
		$T_j = 125^\circ\text{C}$	$I_F = 15\text{ A}$		0.65	0.72	

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

To evaluate the conduction losses use the following equation:

$$P = 0.42 \times I_{F(AV)} + 0.020 I_{F(RMS)}^2$$

Figure 1. Average forward power dissipation versus average forward current

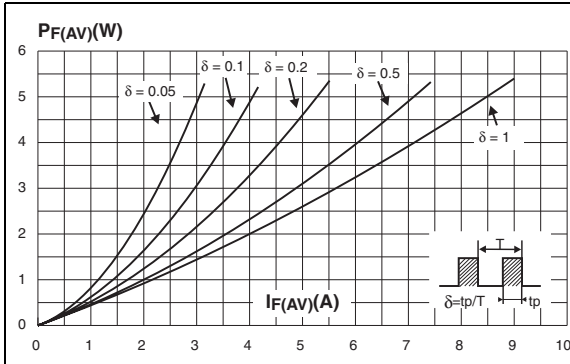


Figure 2. Average forward current versus ambient temperature (delta = 0.5)

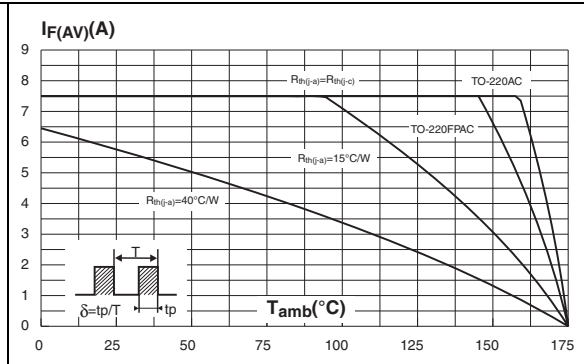


Figure 3. Normalized avalanche power derating versus pulse duration

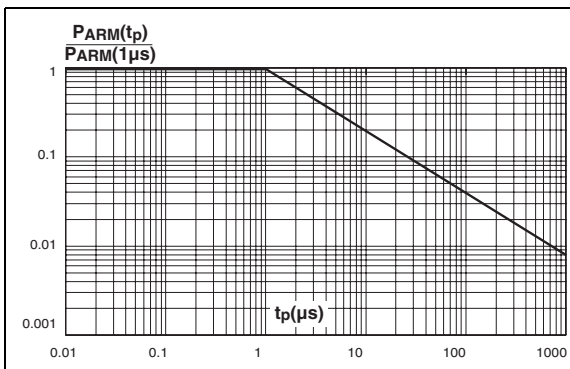


Figure 4. Normalized avalanche power derating versus junction temperature

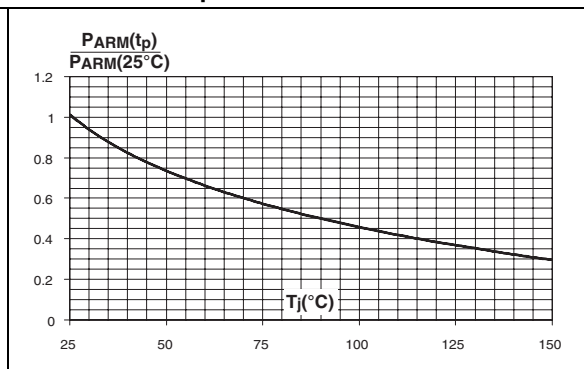


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values) (TO-220AC and D²PAK)

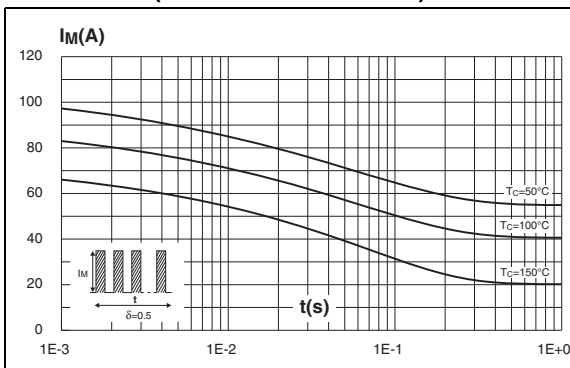


Figure 6. Non repetitive surge peak forward current versus overload duration (maximum values) (TO-220FPAC)

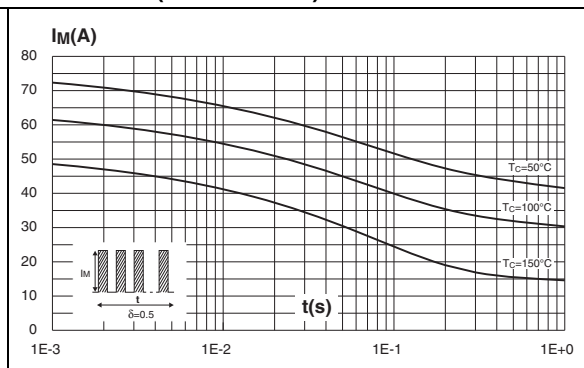


Figure 7. Relative variation of thermal transient impedance junction to case versus pulse duration (TO-220AC and D²PAK)

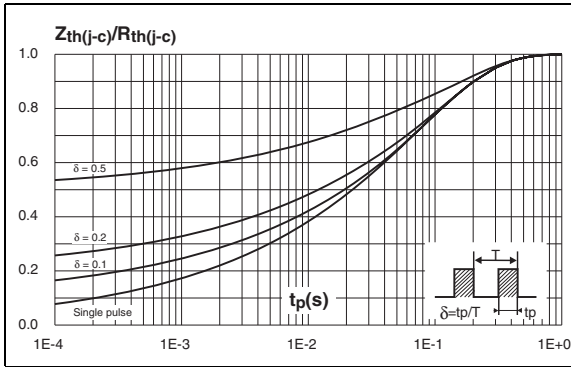


Figure 8. Relative variation of thermal transient impedance junction to case versus pulse duration (TO-220FPAC)

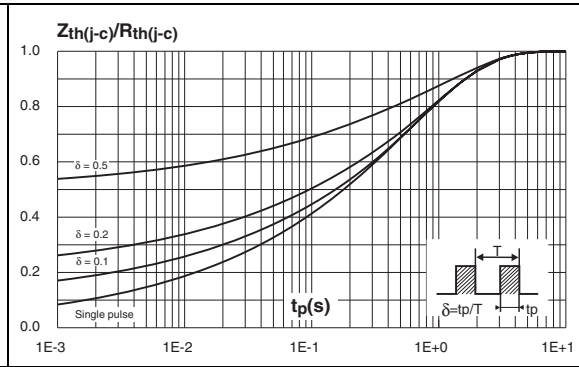


Figure 9. Reverse leakage current versus reverse voltage applied (typical values)

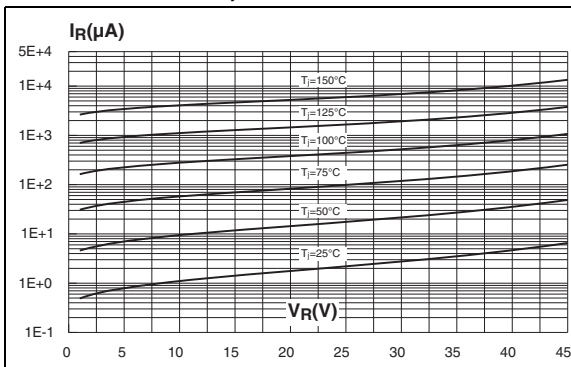


Figure 10. Junction capacitance versus reverse voltage applied (typical values)

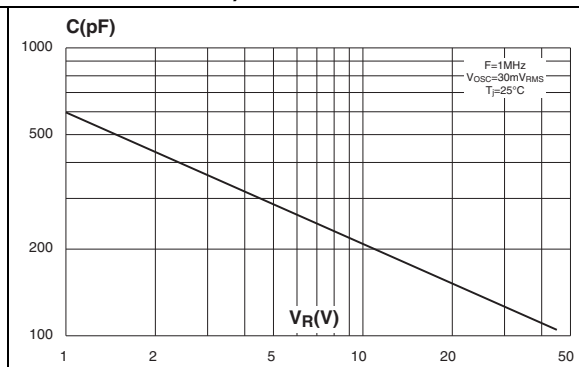


Figure 11. Forward voltage drop versus forward current (maximum values)

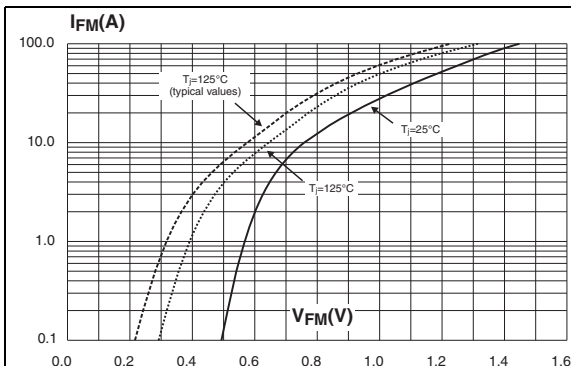
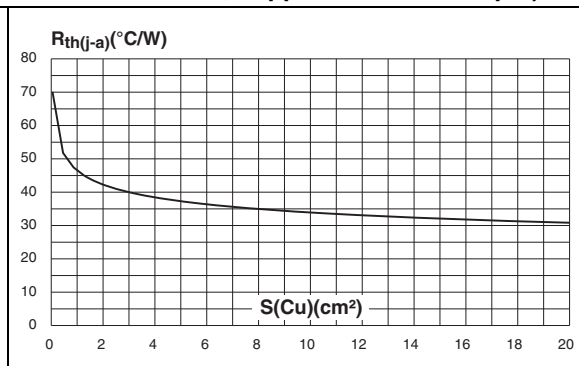


Figure 12. Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board, copper thickness: 35 μm)



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)

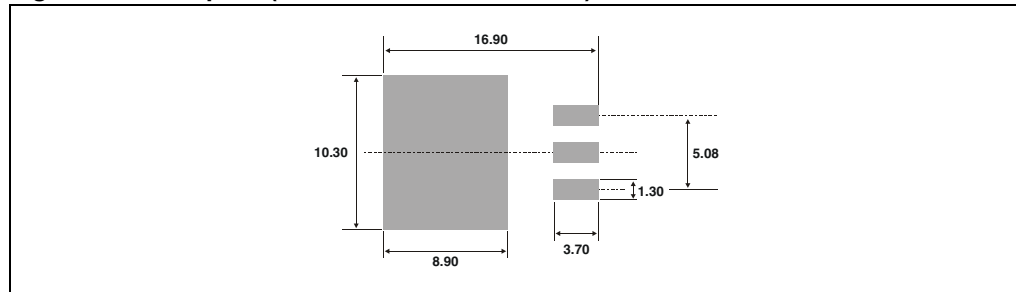


Table 5. TO-220FPAC dimensions

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 ₂ PAK	1.48 g	50	Tube
STPS745G-TR	STPS745G	D ₂ PAK	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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