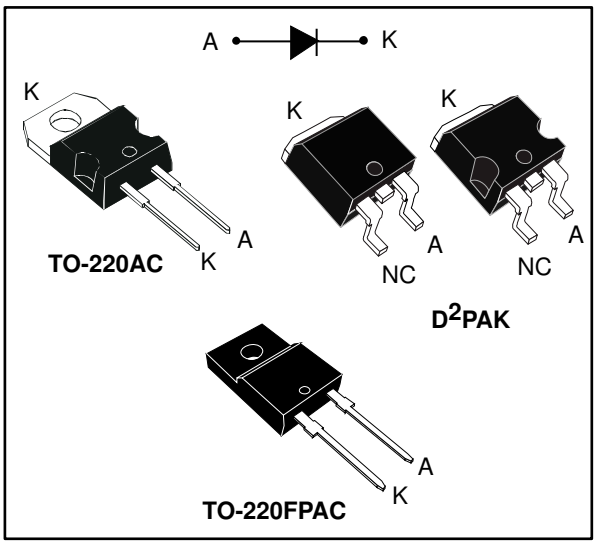
STPS1545

Power Schottky rectifier

Datasheet - production data



Description

Single chip Schottky rectifier suited for switch mode power supply and high frequency DC to DC converters.
Packaged 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.

Table 1: Device summary

Symbol	Value
$I_{F(AV)}$	15 A
V_{RRM}	45 V
T_j (max.)	175 °C
V_F (typ.)	0.5 V

Features

- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Insulated package: TO-220FPAC, insulating voltage = 2000 V_{RMS} sine
- Avalanche capability specified
- ECOPACK®2 compliant component for D²PAK on demand

1 Characteristics

Table 2: Absolute ratings (limiting values at 25 °C, unless otherwise specified)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			45	V
$I_{F(RMS)}$	Forward rms current			30	A
$I_{F(AV)}$	Average forward current δ = 0.5, square wave	TO-220AC, D^2PAK	T_C = 155 °C	15	A
		TO-220FPAC	T_C = 130 °C		
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		220	A
P_{ARM}	Repetitive peak avalanche power	t_p = 10 µs, T_j = 125 °C		430	W
T_{stg}	Storage temperature range			-65 to +175	°C
T_j	Maximum operating junction temperature (1)			175	°C

Notes:

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

Table 3: Thermal parameters

Symbol	Parameter		Max. value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AC, D^2PAK	1.6	°C/W
		TO-220FPAC	4.0	

Table 4: Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-		200	µA
		T_j = 125 °C		-	11	40	mA
V_F (1)	Forward voltage drop	T_j = 125 °C	I_F = 15 A	-	0.5	0.57	V
		T_j = 25 °C	I_F = 30 A	-		0.84	
		T_j = 125 °C		-	0.65	0.72	

Notes:

(1)Pulse test: t_p = 380 µs, δ < 2%

To evaluate the conduction losses, use the following equation:

$P = 0.42 \times I_{F(AV)} + 0.01 \times I_{F^2(RMS)}$

1.1 Characteristics (curves)

Figure 1: Average forward power dissipation versus average forward current

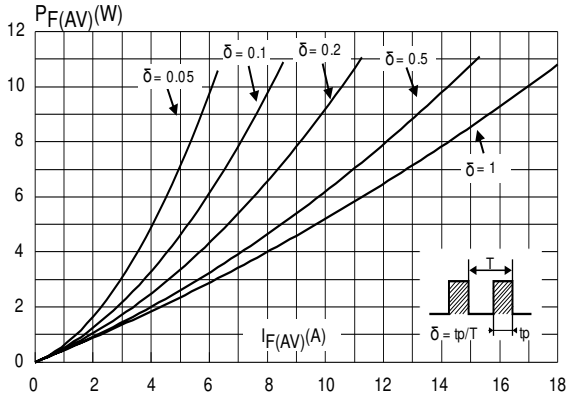


Figure 2: Average forward current versus ambient temperature (δ = 0.5)

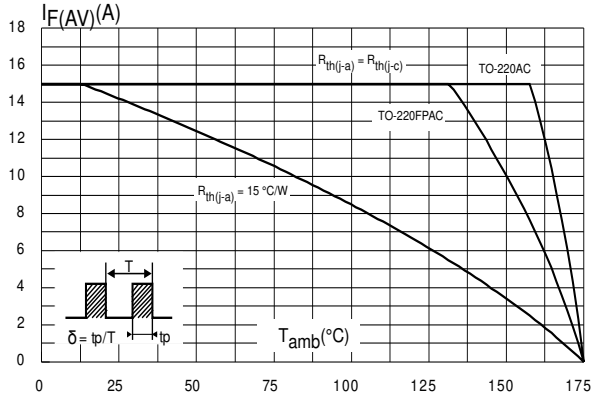


Figure 3: Normalized avalanche power derating versus pulse duration (T_j = 125 °C)

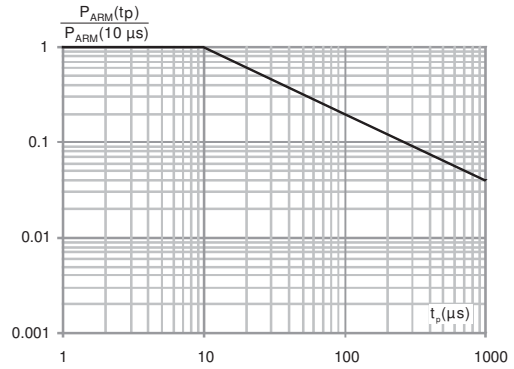


Figure 4: Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC, D²PAK)

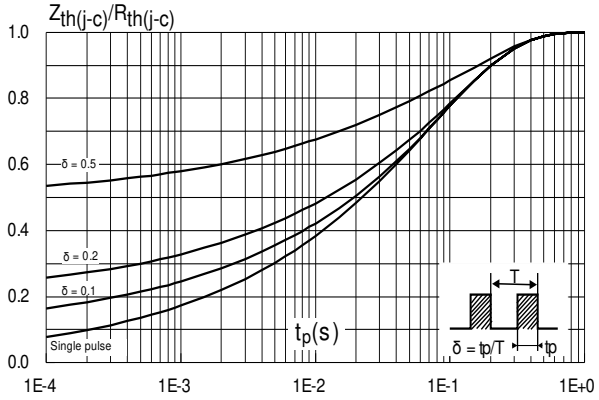


Figure 5: Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAC)

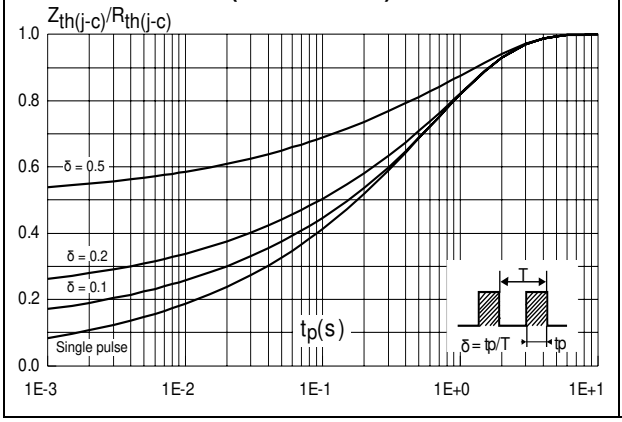


Figure 6: Reverse leakage current versus reverse voltage applied (typical values)

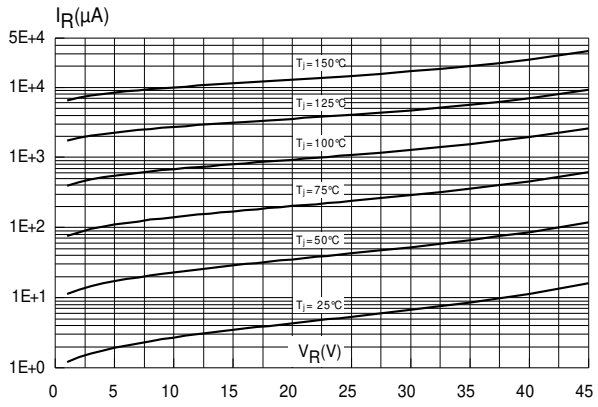


Figure 7: Junction capacitance versus reverse voltage applied (typical values)

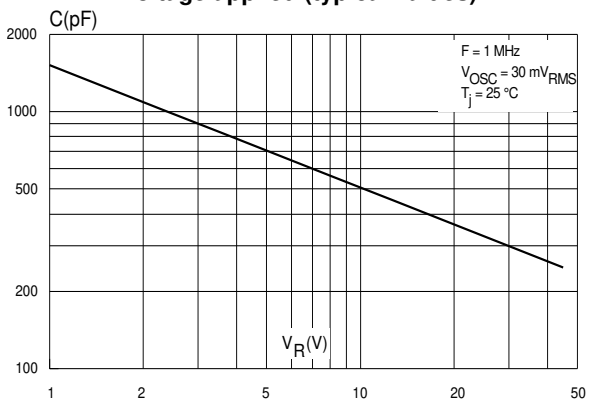


Figure 8: Forward voltage drop versus forward current (maximum values)

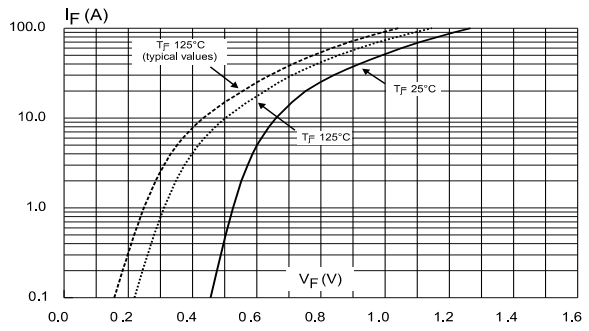
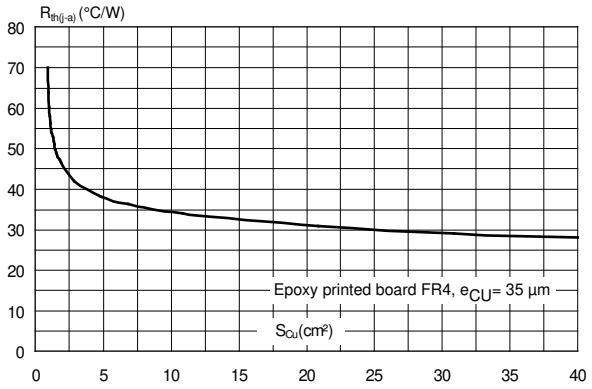


Figure 9: Thermal resistance junction to ambient versus copper surface under tab for D²PAK (typical values)



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.

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0
- Recommended torque value: 0.55 N·m (for TO-220AC and TO-220FPAC)
- Maximum torque value: 0.7 N·m (for TO-220AC and TO-220FPAC)

2.1 TO-220FPAC package information

Figure 10: TO-220FPAC package outline

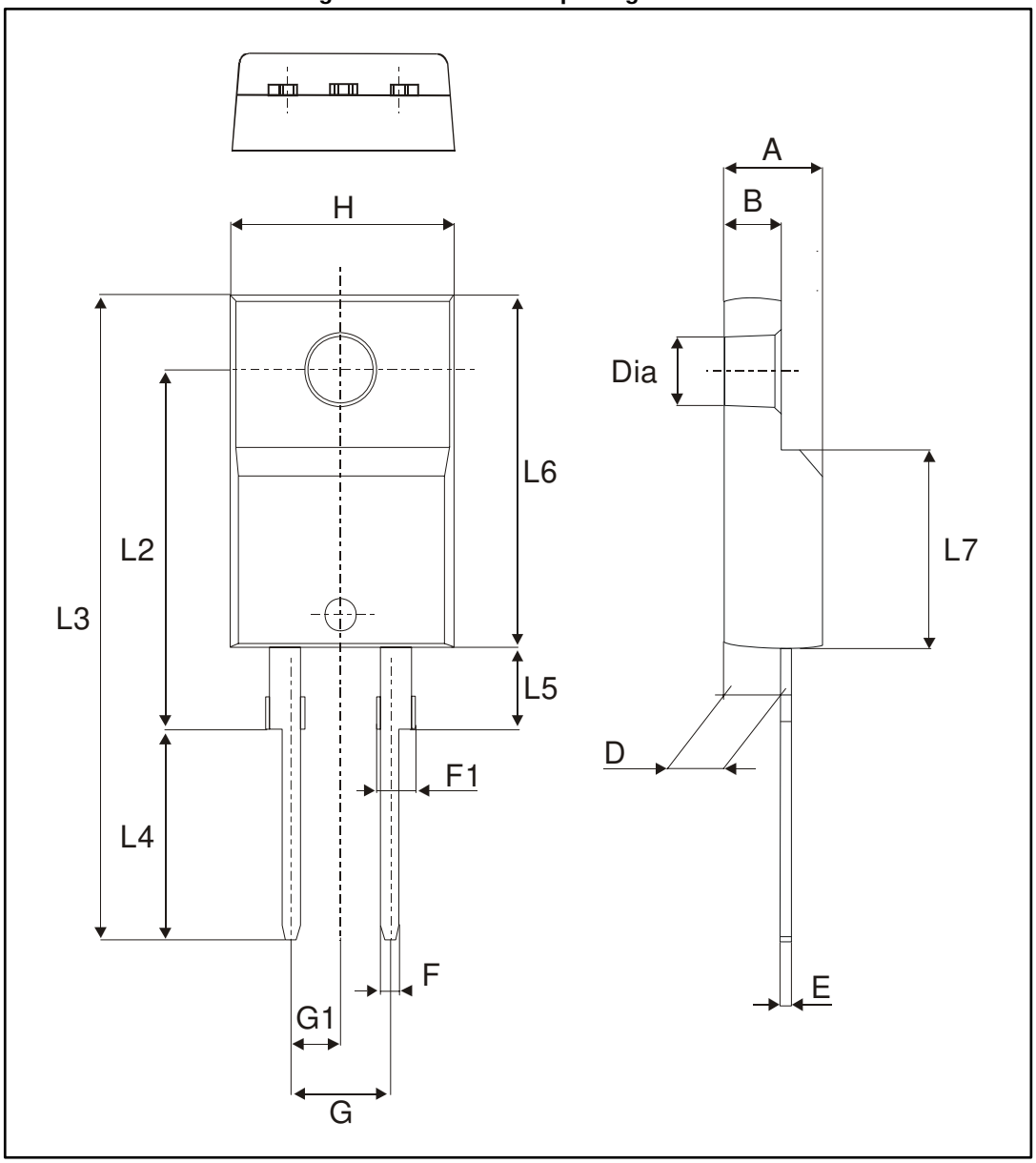
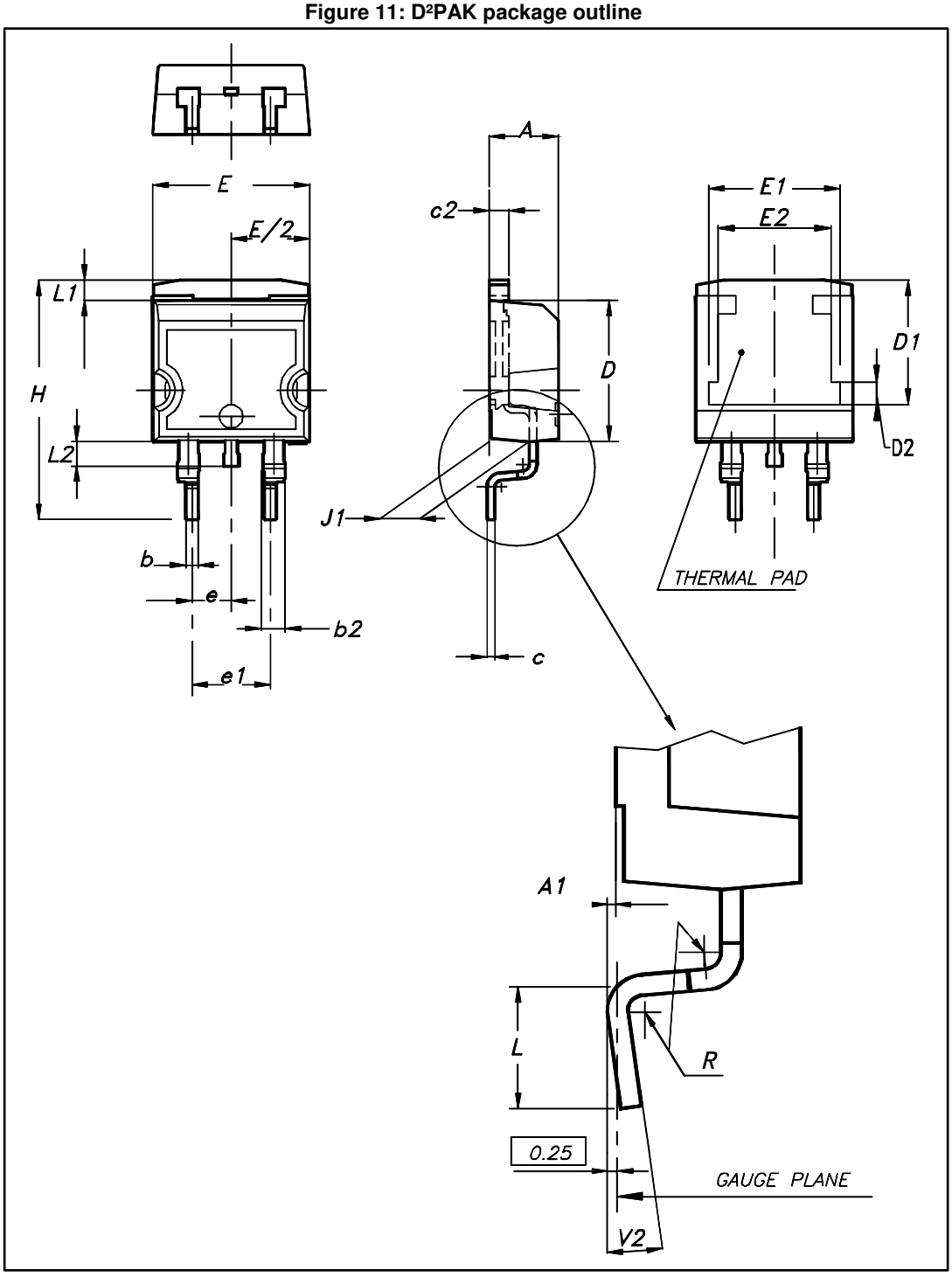


Table 5: TO-220FPAC package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
B	2.50	2.70	0.098	0.106
D	2.50	2.75	0.098	0.108
E	0.45	0.70	0.018	0.027
F	0.75	1.00	0.030	0.039
F1	1.15	1.70	0.045	0.067
G	4.95	5.20	0.195	0.205
G1	2.40	2.70	0.094	0.106
H	10.00	10.40	0.393	0.409
L2	16.00 typ.		0.630 typ.	
L3	28.60	30.60	0.126	1.205
L4	9.80	10.60	0.386	0.417
L5	2.90	3.60	0.114	0.142
L6	15.90	16.40	0.626	0.646
L7	9.00	9.30	0.354	0.366
Dia.	3.00	3.20	0.118	0.126

2.2 D²PAK package information

Figure 11: D²PAK package outline

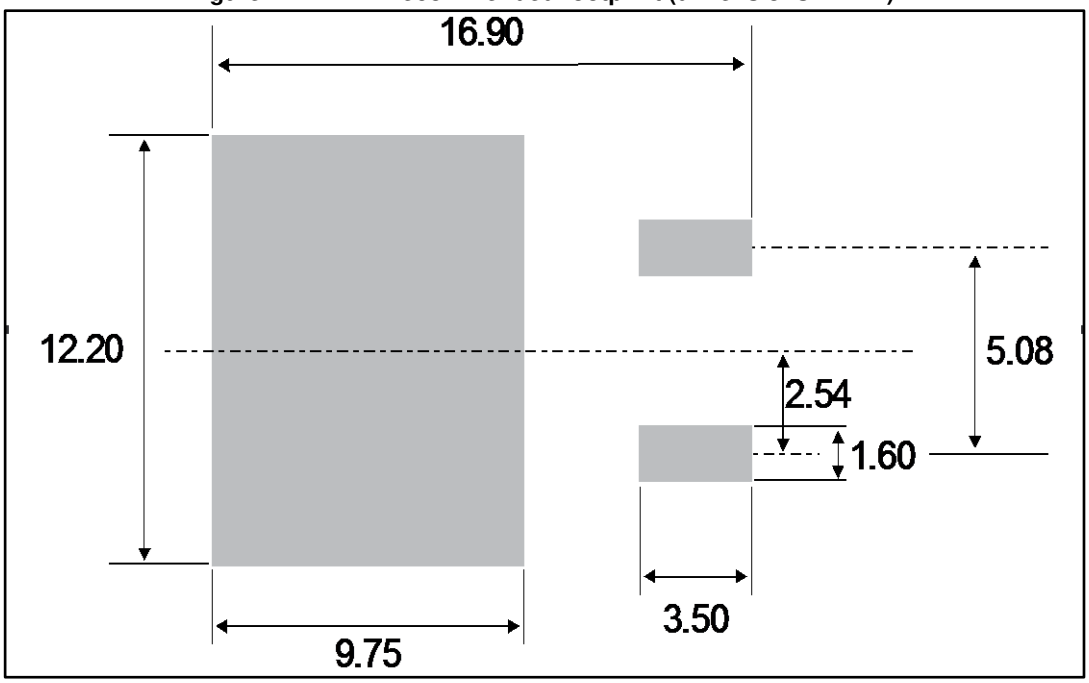


This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 6: D²PAK package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	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
c	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
e	2.54 typ.		0.100	
e1	4.88	5.28	0.190	0.205
H	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 12: D²PAK recommended footprint (dimensions in mm)



2.3 TO-220AC package information

Figure 13: TO-220AC package outline

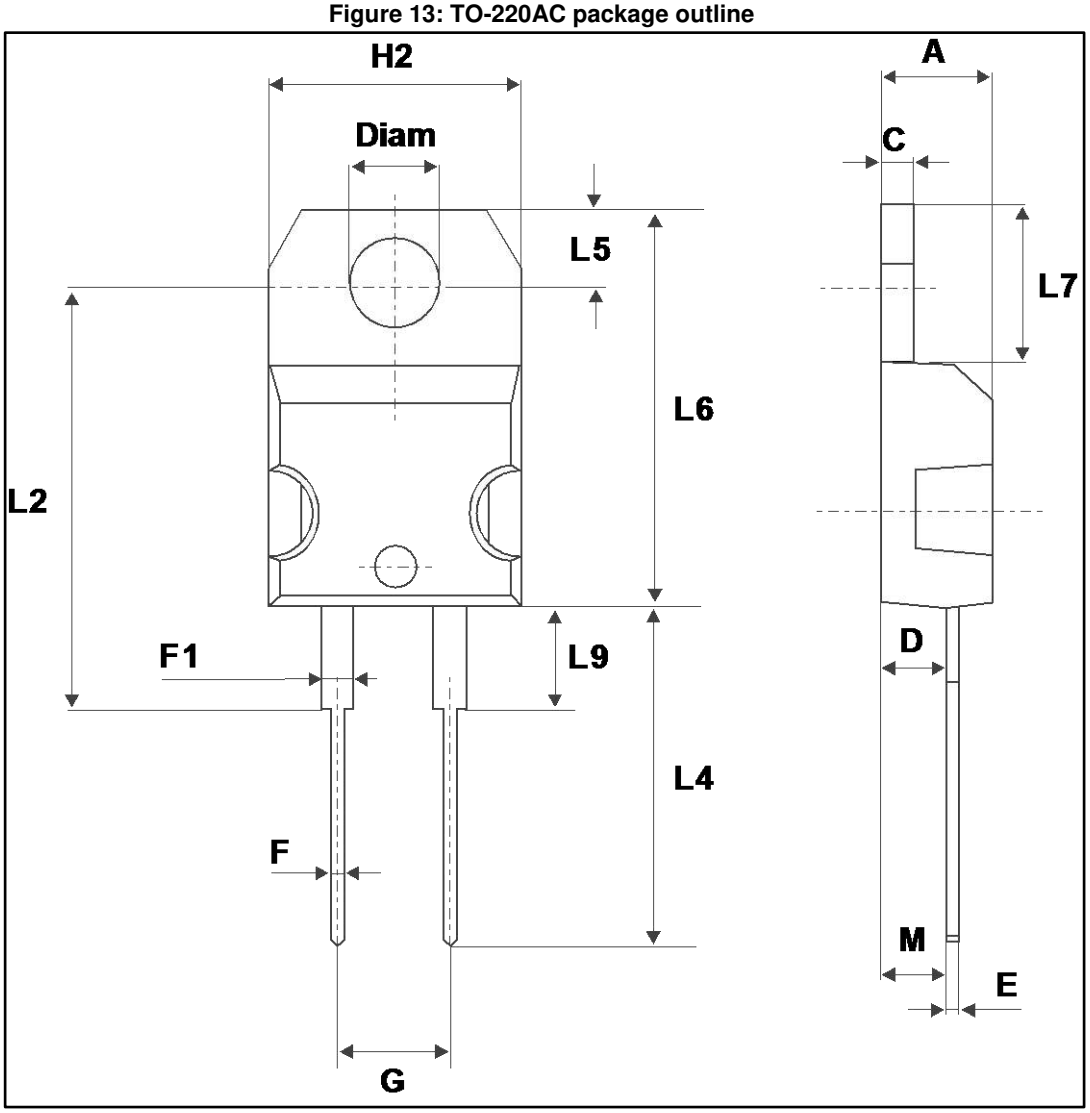


Table 7: TO-220AC package mechanical data

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
G	4.95	5.15	0.194	0.202
H2	10.00	10.40	0.393	0.409
L2	16.40 typ.		0.645 typ.	
L4	13.00	14.00	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

3 Ordering information

Table 8: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS1545D	STPS1545D	TO-220AC	1.86g	50	Tube
STPS1545FP	STPS1545FP	TO-220FPAC	1.9g	50	Tube
STPS1545G-TR	STPS1545G	D^2PAK	1.38g	1000	Tape and reel

4 Revision history

Table 9: Document revision history

Date	Revision	Changes
Jul-2003	5F	Last release.
21-Mar-2007	6	Removed ISOWATT and TO-220FPAB packages.
17-Oct-2016	7	Removed I^2PAK package. Updated cover page. Updated *Section 1: "Characteristics"* and *Section 1.1: "Characteristics (curves)"*. Updated *Section 2.3: "D2PAK package information"*. Updated *Section 3: "Ordering information"*.

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