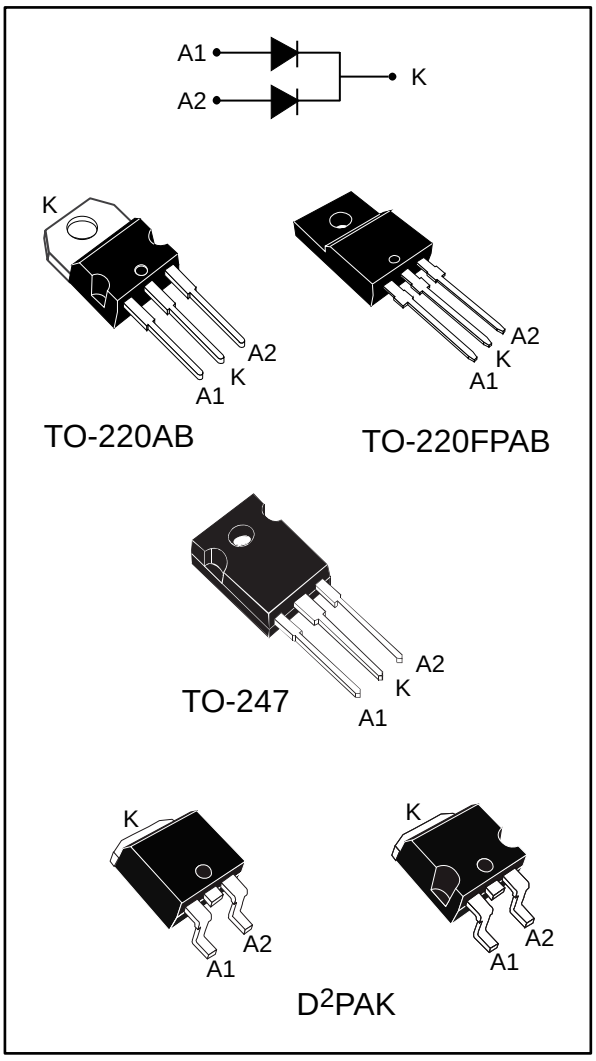
STPS30150C

High voltage power Schottky rectifier

Datasheet - production data



Features

- High junction temperature capability
- Good trade off between leakage current and forward voltage drop
- Low leakage current
- Avalanche capability specified
- Insulated package: TO-220FPAB
  - Insulating voltage = 2000 V_{RMS} sine
- ECOPACK®2 compliant component for D²PAK on demand

Description

Dual center tap Schottky rectifier designed for high frequency switch mode power supply.

Table 1: Device summary

Symbol	Value
$I_{F(AV)}$	2 x 15 A
V_{RRM}	150 V
T_j (max)	175 °C
V_F (typ)	0.69 V

This is information on a product in full production.

1 Characteristics

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

Symbol	Parameter				Value	Unit
V_{RRM}	Repetitive peak reverse voltage				150	V
$I_{F(RMS)}$	Forward rms current				30	A
$I_{F(AV)}$	Average forward current δ = 0.5, square wave	TO-220FPAB	T_C = 120 °C	Per diode	15	A
			T_C = 90 °C	Per device	30	
		TO-220AB, D^2PAK, TO-247	T_C = 155 °C	Per diode	15	
			T_C = 150 °C	Per device	30	
I_{FSM}	Surge non repetitive forward current	tp = 10 ms sinusoidal			220	A
P_{ARM}	Repetitive peak avalanche power	t_p = 10 µs, T_j = 125 °C			750	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 parameter

Symbol	Parameter			Max. value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AB, D^2PAK	Per diode	1.6	°C/W
		TO-220FPAB		4	
		TO-247		1.5	
		TO-220AB, D^2PAK	Total	0.85	
		TO-220FPAB		3.3	
		TO-247		0.8	
$R_{th(c)}$	Coupling	TO-220AB, D^2PAK, TO-247	-	0.1	°C/W
		TO-220FPAB		2.6	

When the diodes 1 and 2 are used simultaneously:

$\Delta T_{j\ (diode1)} = P_{(diode1)} \times R_{th(j-c)}$ (per diode) + $P_{(diode2)} \times R_{th(c)}$

Table 4: Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-		6.5	µA
		T_j = 125 °C		-		8.0	mA
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 15 A	-		0.92	V
		T_j = 125 °C		-	0.69	0.75	
		T_j = 25 °C	I_F = 30 A	-		1	
		T_j = 125 °C		-	0.8	0.86	

Notes:

(1)Pulse test: t_p = 5 ms, δ < 2%

(2)Pulse test: t_p = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation:

$P = 0.64 \times I_{F(AV)} + 0.0073\ I_F{}^2{}_{(RMS)}$

1.1 Characteristics (curves)

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

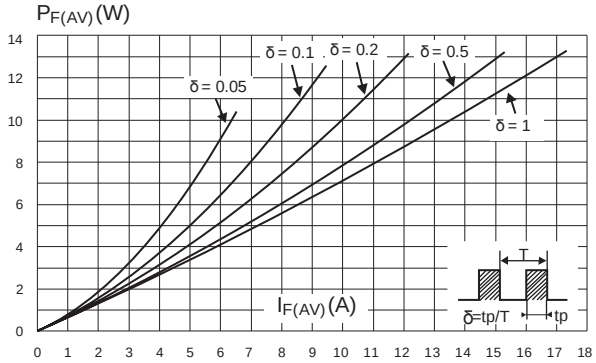


Figure 2: Average forward current versus ambient temperature (δ = 0.5, per diode)

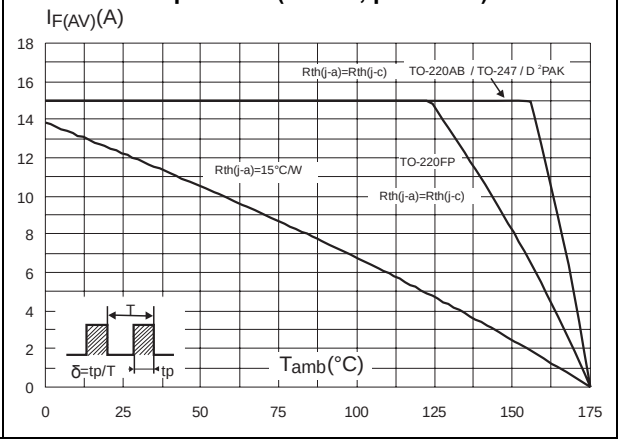


Figure 3: Normalized avalanche power derating versus pulse duration (Tj = 125 °C)

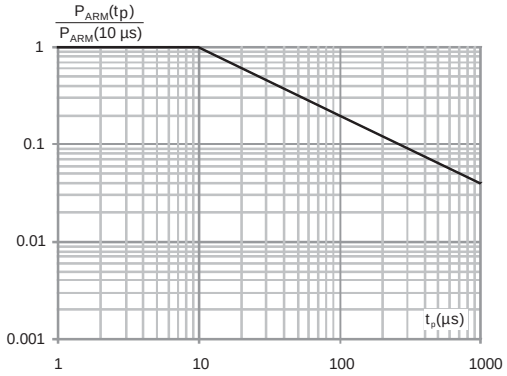


Figure 4: Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB, D²PAK, TO-247)

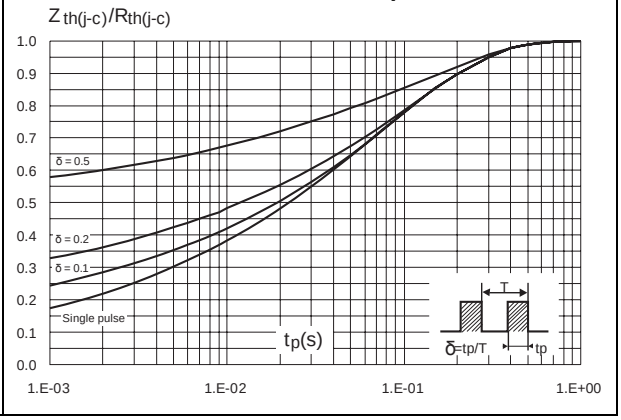


Figure 5: Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

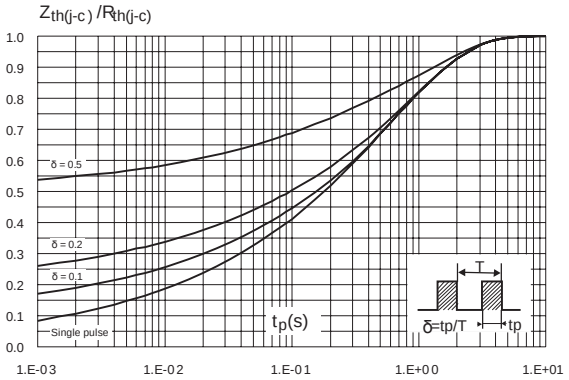


Figure 6: Reverse leakage current versus reverse voltage applied (typical values, per diode)

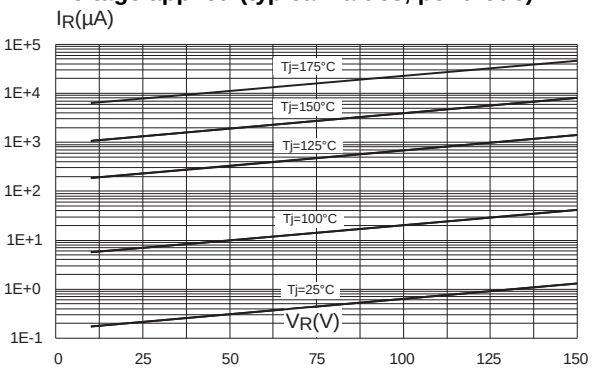


Figure 7: Junction capacitance versus reverse voltage applied (typical values, per diode)

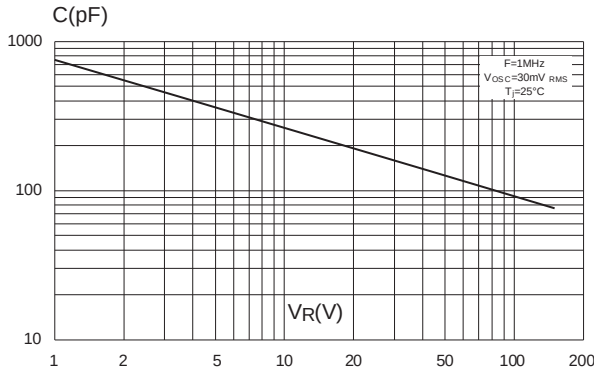


Figure 8: Forward voltage drop versus forward current (per diode)

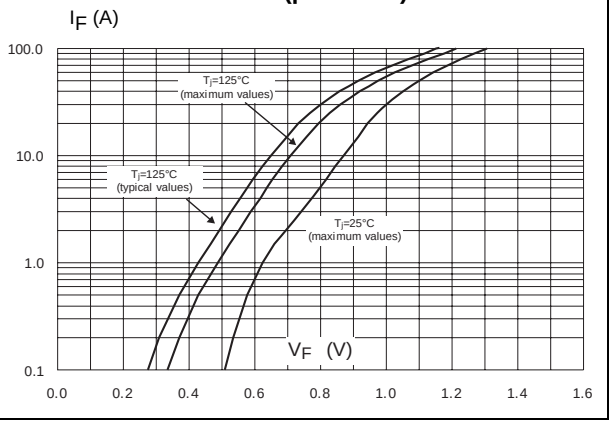
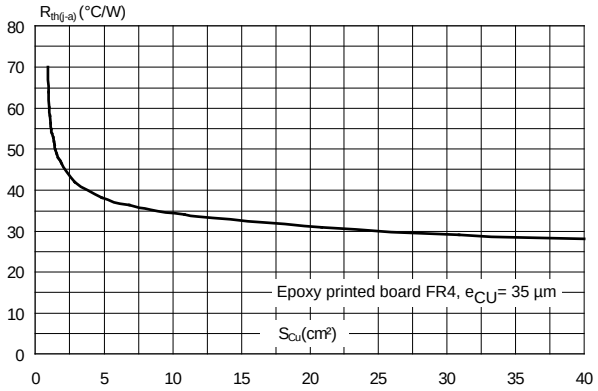


Figure 9: Thermal resistance junction to ambient versus copper surface under tab for D²PAK (typical values)



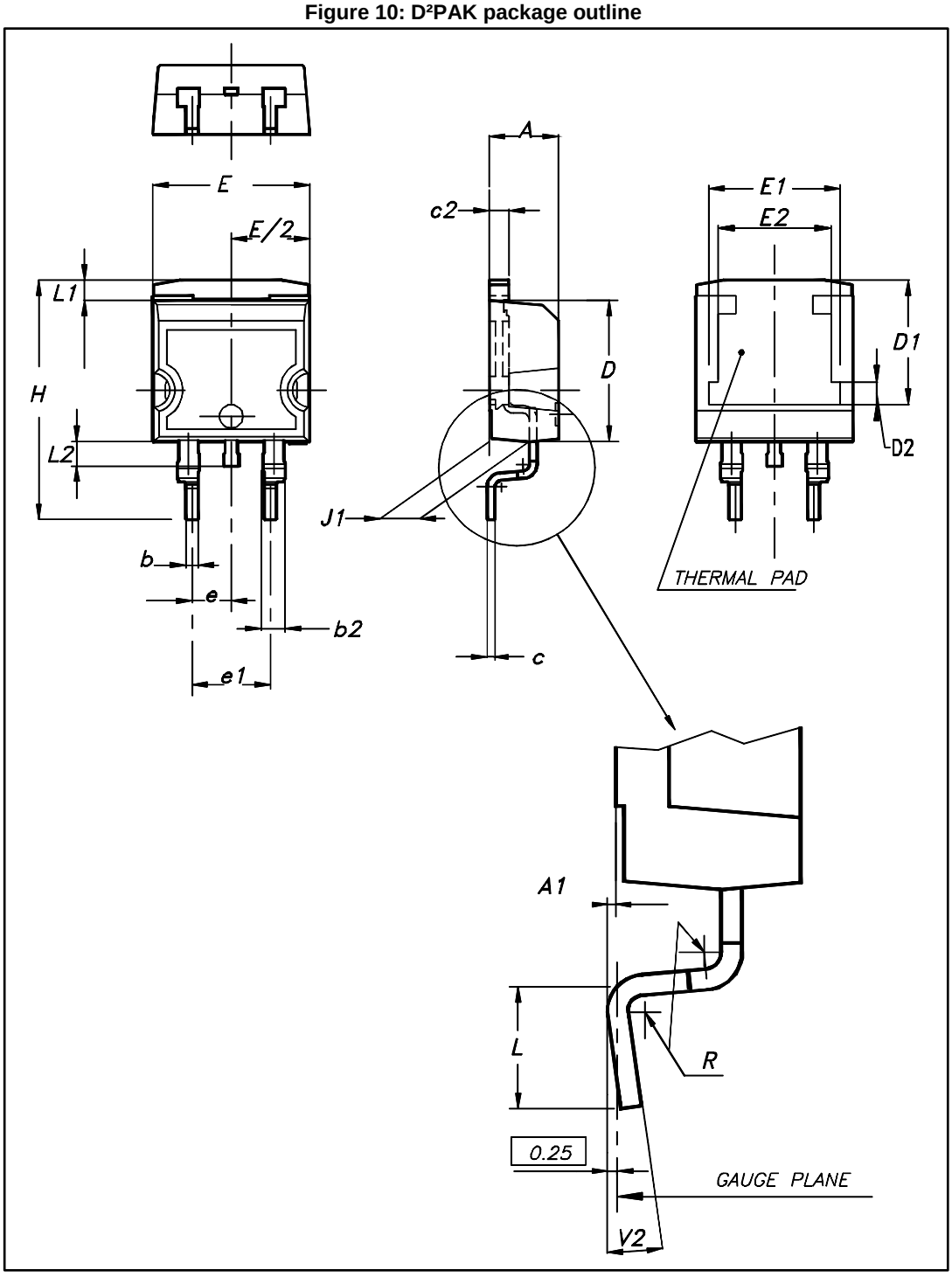
2 Package information

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
- Torque values (TO-220AB and TO-220FPAB): 0.55 N·m recommended; 0.7 N·m maximum
- Torque values (TO-247): 0.55 N·m recommended; 1.0 N·m maximum

2.1 D²PAK package information

Figure 10: D²PAK package outline

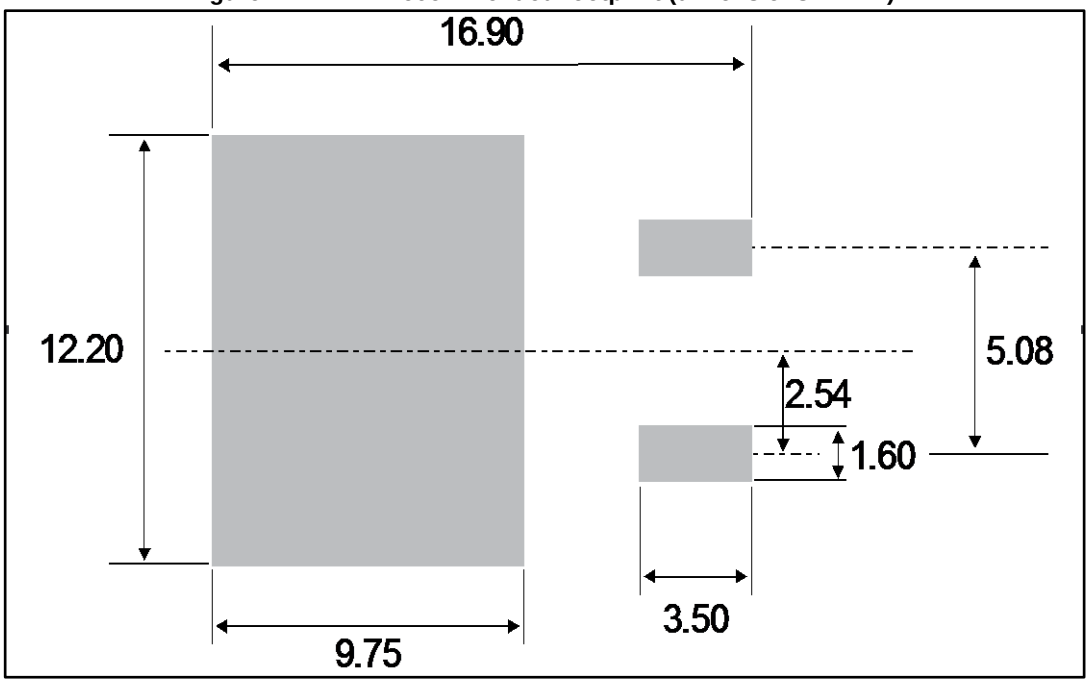


This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 5: 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 11: D²PAK recommended footprint (dimensions in mm)



2.2 TO-220AB package information

Figure 12: TO-220AB package outline

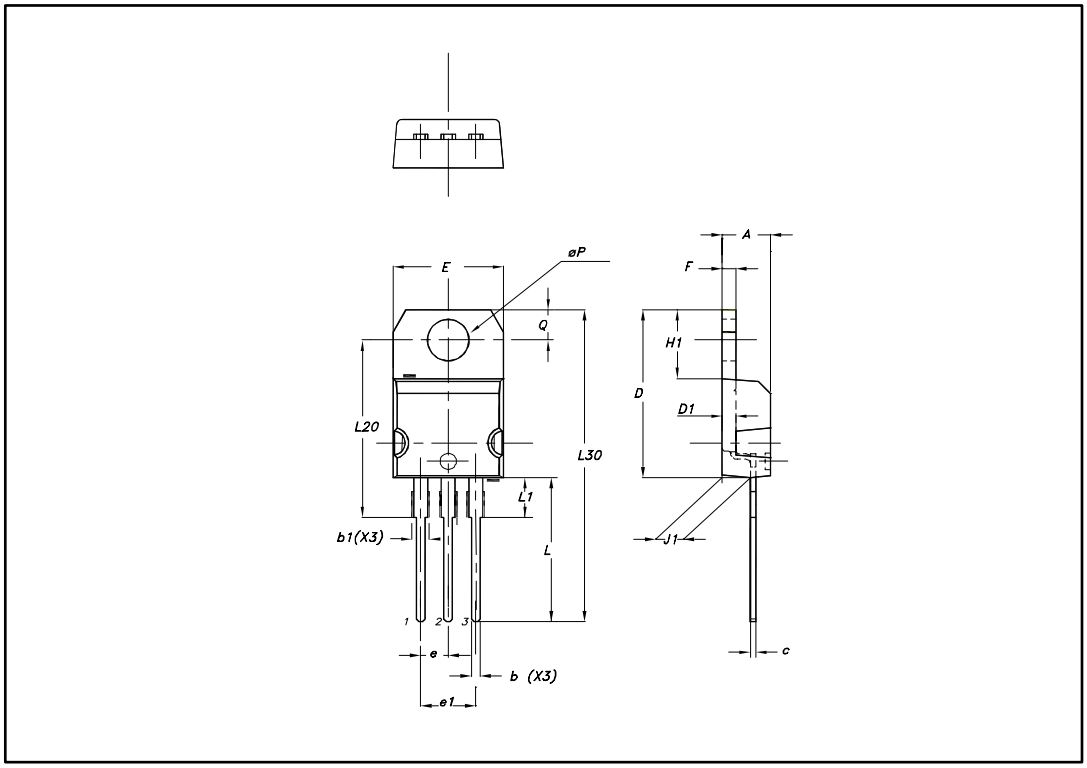


Table 6: TO-220AB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches[1]	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.1732	0.1811
b	0.61	0.88	0.0240	0.0346
b1	1.14	1.70	0.0449	0.0669
c	0.48	0.70	0.0189	0.0276
D	15.25	15.75	0.6004	0.6201
D1	1.27 typ.		0.0500 typ.	
E	10.00	10.40	0.3937	0.4094
e	2.40	2.70	0.0945	0.1063
e1	4.95	5.15	0.1949	0.2028
F	1.23	1.32	0.0484	0.0520
H1	6.20	6.60	0.2441	0.2598
J1	2.40	2.72	0.0945	0.1071
L	13.00	14.00	0.5118	0.5512
L1	3.50	3.93	0.1378	0.1547
L20	16.40 typ.		0.6457 typ.	
L30	28.90 typ.		1.1378 typ.	
ØP	3.75	3.85	0.1476	0.1516
Q	2.65	2.95	0.1043	0.1161

Notes:

[1]Inch dimensions are for reference only.

2.3 TO-220FPAB package information

Figure 13: TO-220FPAB package outline

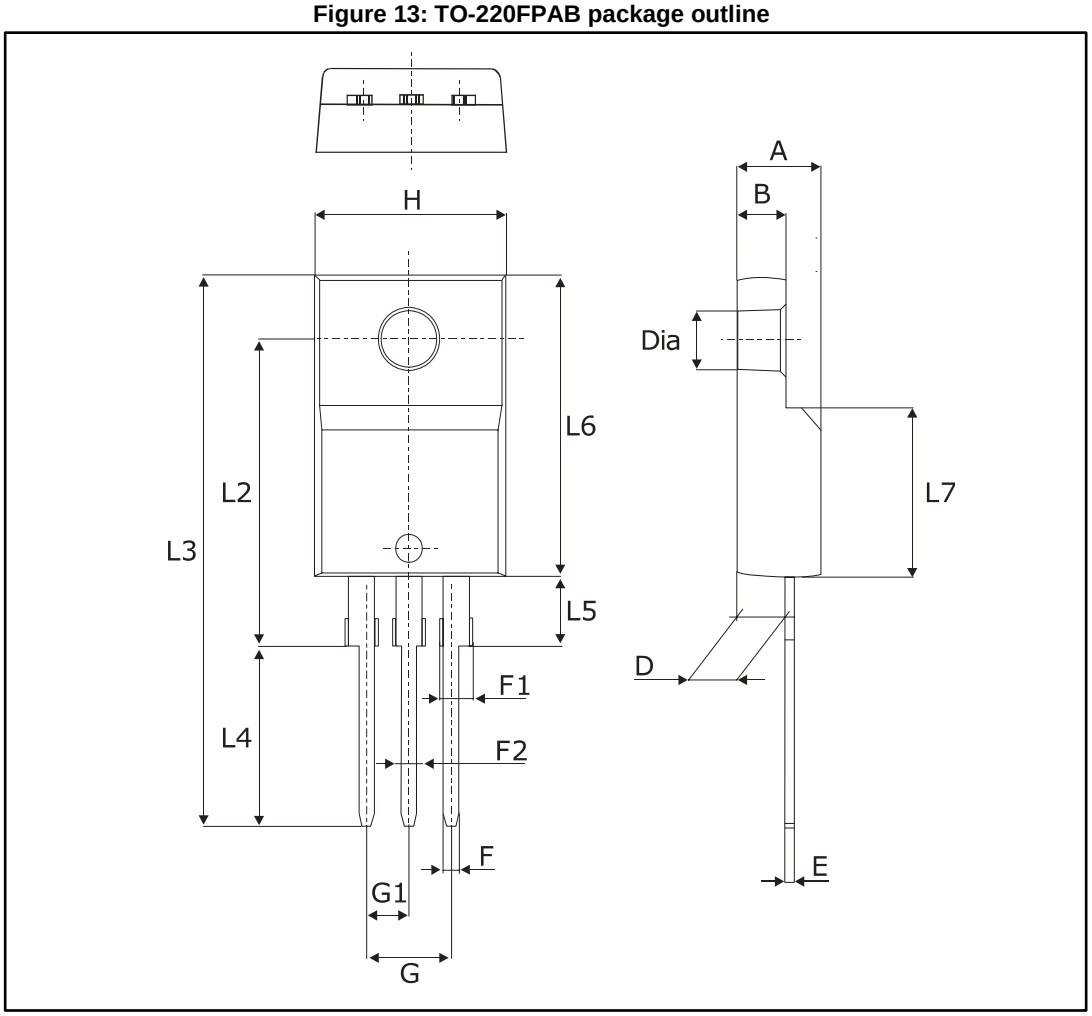


Table 7: TO-220FPAB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.1739	0.1818
B	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
H	10.00	10.40	0.3953	0.4111
L2	16.00 typ.		0.6324 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

2.4 TO-247 package information

Figure 14: TO-247 package outline

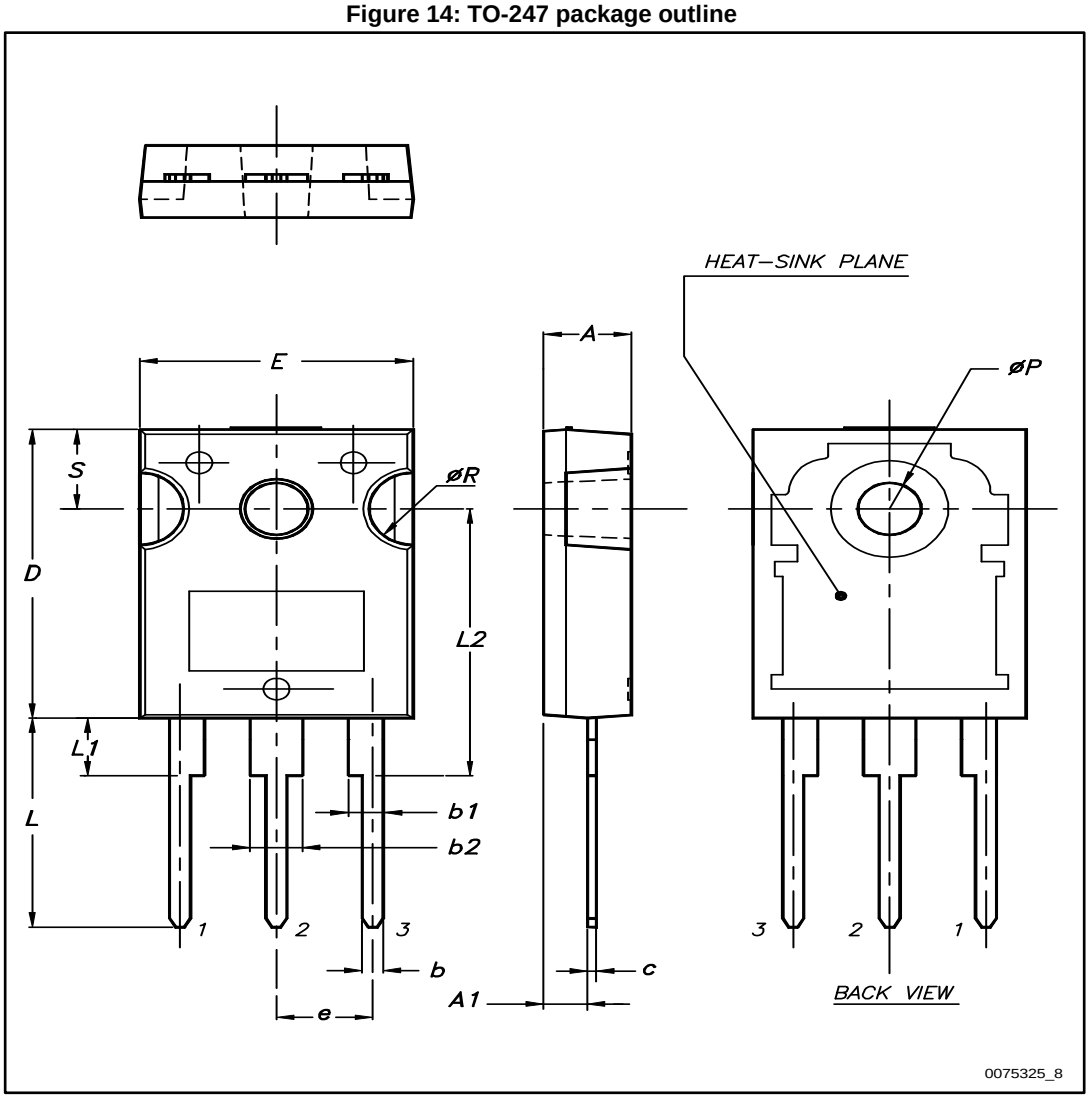


Table 8: TO-247 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.85		5.15	0.191		0.203
A1	2.20		2.60	0.086		0.102
b	1.00		1.40	0.039		0.055
b1	2.00		2.40	0.078		0.094
b2	3.00		3.40	0.118		0.133
c	0.40		0.80	0.015		0.031
D(1)	19.85		20.15	0.781		0.793
E	15.45		15.75	0.608		0.620
e	5.30	5.45	5.60	0.209	0.215	0.220
L	14.20		14.80	0.559		0.582
L1	3.70		4.30	0.145		0.169
L2		18.50			0.728	
ØP(2)	3.55		3.65	0.139		0.143
ØR	4.50		5.50	0.177		0.217
S	5.30	5.50	5.70	0.209	0.216	0.224

Notes:

(1)Dimension D plus gate protusion does not exceed 20.5 mm

(2)Resin thickness around the mounting hole is not less than 0.9 mm.

3 Ordering information

Table 9: Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS30150CT	STPS30150CT	TO-220AB	1.95g	50	Tube
STPS30150CFP	STPS30150CFP	TO-220FPAB	1.9g	50	Tube
STPS30150CW	STPS30150CW	TO-247	4.4g	30	Tube
STPS30150CG-TR	STPS30150CG	D^2PAK	1.38g	1000	Tape and reel

4 Revision history

Table 10: Document revision history

Date	Revision	Changes
Feb-2004	7	Previous release
26-Nov-2010	8	Added ECOPACK statement. Corrected package name in *Figure 12*.
16-May-2017	9	Updated features and package silhouettes in cover page. Updated *Section 1: "Characteristics"*, *Section 1.1: "Characteristics (curves)"*, *Section 2: "Package information"* and *Section 3: "Ordering information"*. Minor text changes.

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