
Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 x 10 A
V_{RRM}	45 V
$T_{j(max)}$	175 °C
$V_{F(typ)}$	0.57 V

Features

- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Insulated package: TO-220FPAB
 - Insulating voltage = 2000 V AC rms
 - Capacitance = 12 pF
- Avalanche rated

Description

Dual center tap Schottky rectifier suited for switch mode power supply and high frequency DC to DC converters.

Packaged either in TO-220AB, TO-220FPAB, I²PAK, or D²PAK, this device is especially intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.

1 Characteristics

Table 2. Absolute ratings (limiting values, per diode)

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 $\delta = 0.5$	TO-220AB D ² PAK I ² PAK	T _c = 155 °C	Per diode	10	A
		TO-220FPAB	T _c = 125 °C	Per device	20	
I _{FSM}	Surge non repetitive forward current		t _p = 10 ms sinusoidal	180	A	
P _{ARM} ⁽¹⁾	Repetitive peak avalanche power		T _j = 125 °C, t _p = 10 μ s	280	W	
V _{ARM} ⁽²⁾	Maximum repetitive peak avalanche voltage		t _p < 10 μ s, T _j < 125 °C, I _{AR} < 7.7 A	60	V	
V _{ASM} ⁽²⁾	Maximum single-pulse peak avalanche voltage					
T _{stg}	Storage temperature range			-65 to + 175	°C	
T _j	Maximum operating junction temperature ⁽³⁾			175	°C	

- For pulse time duration deratings, please refer to [Figure 3](#). More details regarding the avalanche energy measurements and diode validation in the avalanche are provided in the STMicroelectronics Application notes AN1768, "Admissible avalanche power of Schottky diodes" and AN2025, "Converter improvement using Schottky rectifier avalanche specification".
- See [Figure 9](#)
- $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$ condition to avoid thermal runaway for a diode on its own heatsink

Table 3. Thermal resistances parameters

Symbol	Parameter			Value	Unit
R _{th(j-c)}	Junction to case	TO-220AB / D ² PAK / I ² PAK	Per diode	2.2	°C/W
			Total	1.4	
	TO-220FPAB	Per diode	4.5		
		Total	3.5		
R _{th(c)}	Coupling	TO-220AB / D ² PAK / I ² PAK	Coupling	0.4	°C/W
		TO-220FPAB		2.5	

When the diodes 1 and 2 are used simultaneously:

$$T_j(\text{diode 1}) = P(\text{diode1}) \times R_{th(j-c)}(\text{per diode}) + P(\text{diode2}) \times R_{th(c)}$$

Table 4. Static electrical characteristics (per diode)

Symbol	Test conditions	Min.	Typ.	Max.	Unit	
$I_R^{(1)}$	Reverse leakage current	$V_R = V_{RRM}$	$T_j = 25\text{ }^\circ\text{C}$		100	μA
			$T_j = 125\text{ }^\circ\text{C}$		7	15
$V_F^{(1)}$	Forward voltage drop	$I_F = 10\text{ A}$	$T_j = 125\text{ }^\circ\text{C}$		0.5	0.57
			$T_j = 25\text{ }^\circ\text{C}$			0.84
			$T_j = 125\text{ }^\circ\text{C}$	$I_F = 20\text{ A}$		0.65

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

To evaluate the conduction losses use the following equation:

$$P = 0.42 \times I_{F(AV)} + 0.015 I_{F(RMS)}^2$$

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

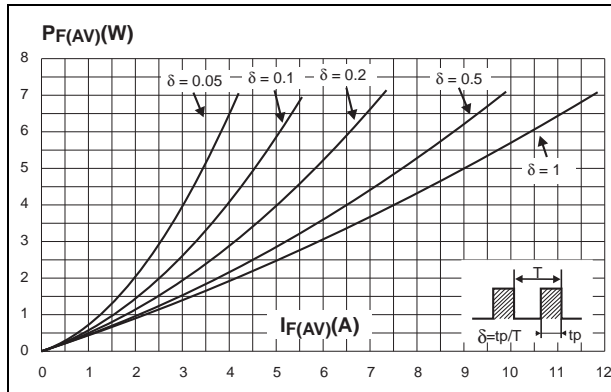


Figure 2. Average forward current versus ambient temperature (delta = 0.5, per diode)

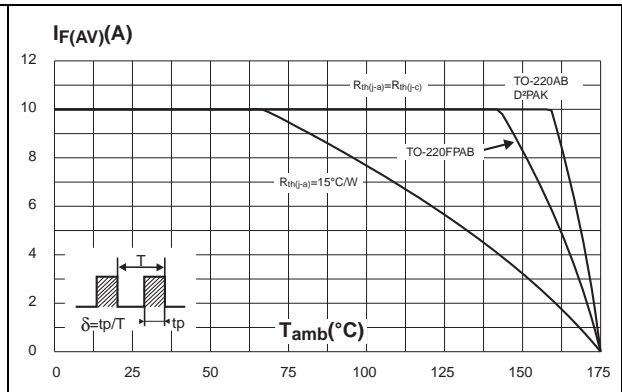


Figure 3. Normalized avalanche power derating versus pulse duration

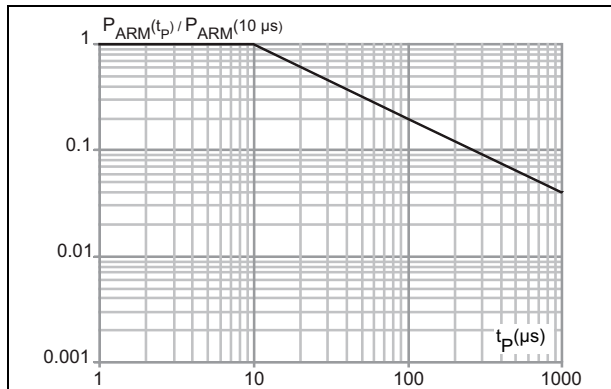


Figure 4. Reverse leakage current versus reverse voltage applied (typical values, per diode)

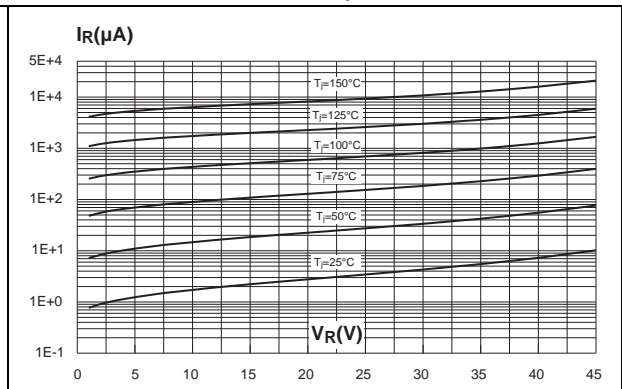


Figure 5. Relative variation of thermal impedance junction to ambient versus pulse duration

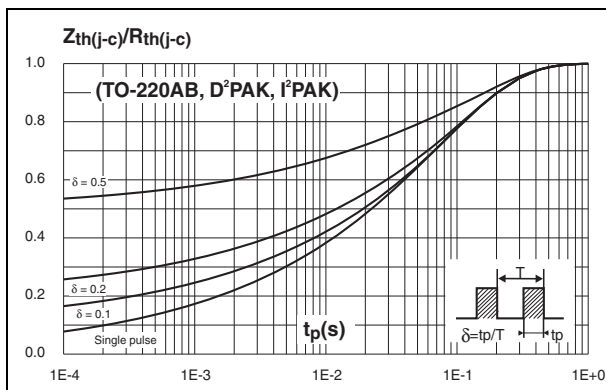


Figure 6. Relative variation of thermal impedance junction to ambient versus pulse duration (TO-220FPAB)

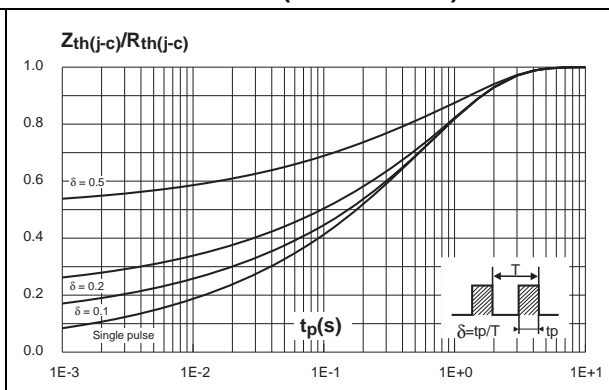


Figure 7. Junction capacitance versus reverse voltage applied (typical values, per diode)

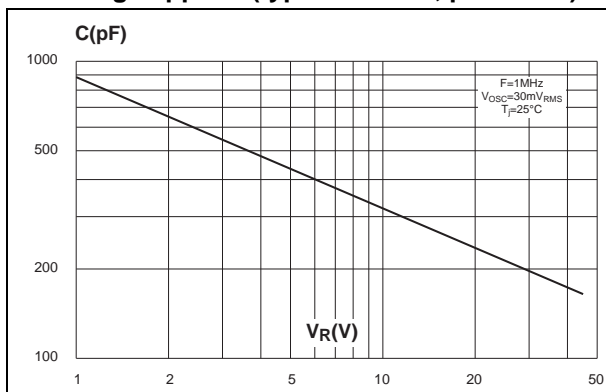


Figure 8. Forward voltage drop versus forward current (maximum values, per diode)

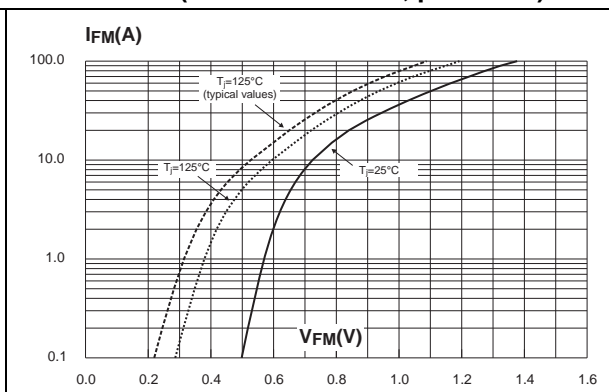


Figure 9. Reverse safe operating area ($t_p < 10 \mu\text{s}$ and $T_j < 125^\circ\text{C}$)

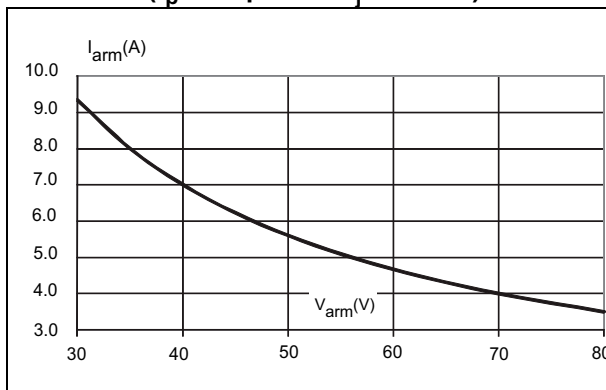
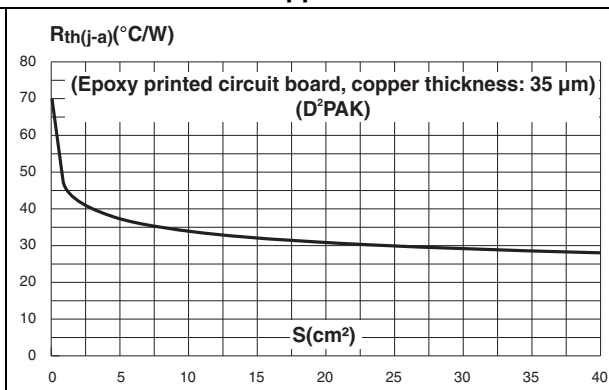


Figure 10. Thermal resistance junction to ambient versus copper surface under tab

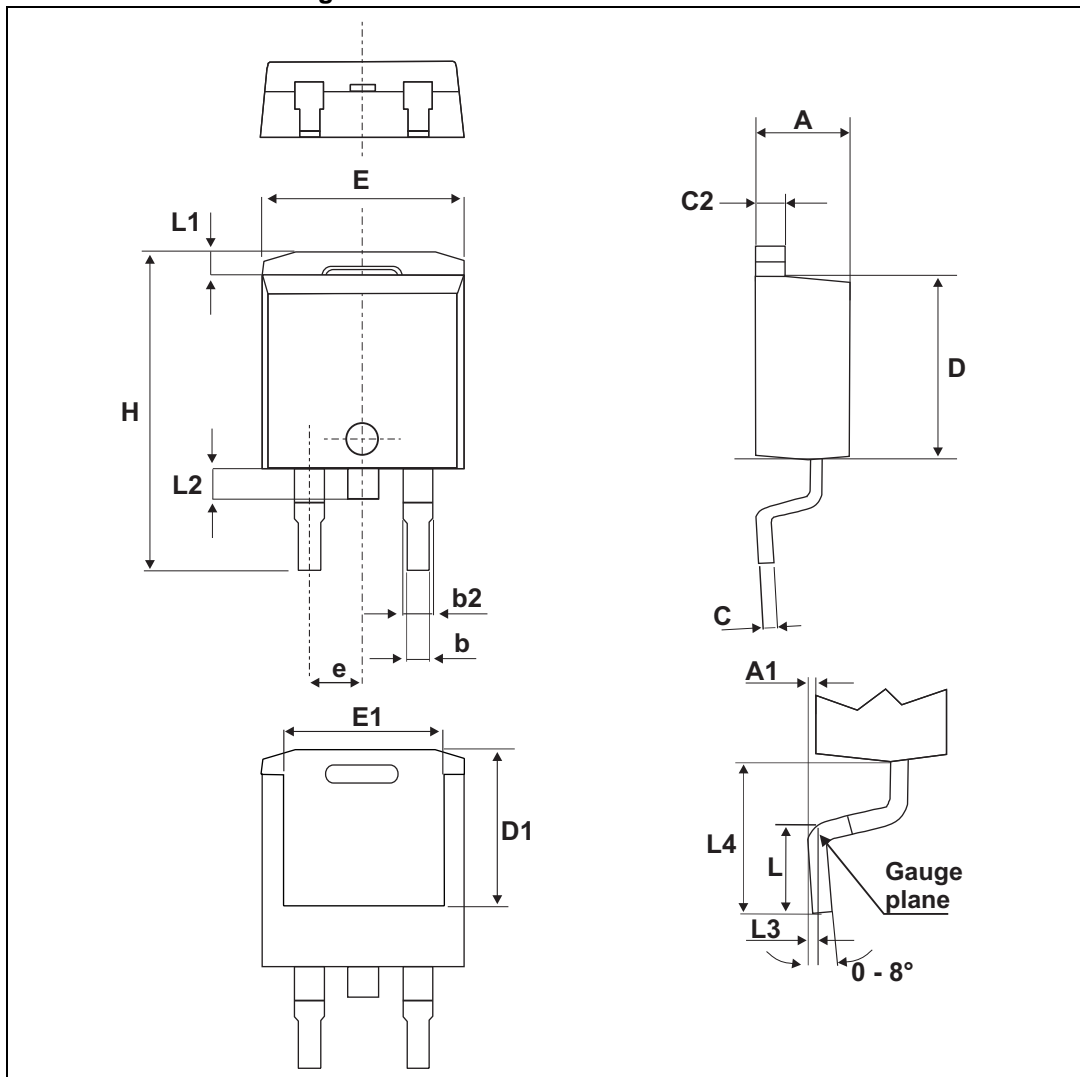


2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value (TO-220AB, TO-220FPAB): 0.4 N·m to 0.6 N·m

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.

Figure 11. D²PAK dimension definitions



This D²PAK above drawing is an illustration provided for information only.

D²PAK real shape may slightly differ from this particular example.

Nevertheless, this mechanical dimensions specified in the table will remain applicable.

Table 5. D²PAK dimension values

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.36	4.60	0.172	0.181
A1	0.00	0.23	0.000	0.009
b	0.70	0.93	0.028	0.037
b2	1.14	1.70	0.045	0.067
c	0.38	0.694	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	-	0.272	-
E	10.00	10.55	0.394	0.415
E1	8.10	-	0.319	-
e	2.54 typ.		0.100 typ.	
H	15.00	15.85	0.591	0.624
L	1.90	2.79	0.075	0.110
L1	-	1.65	-	0.065
L2	-	1.78	-	0.070
L3	0.25 typ.		0.010 typ.	
L4	4.78	5.28	0.188	0.208

Figure 12. D²PAK footprint dimensions (in mm)

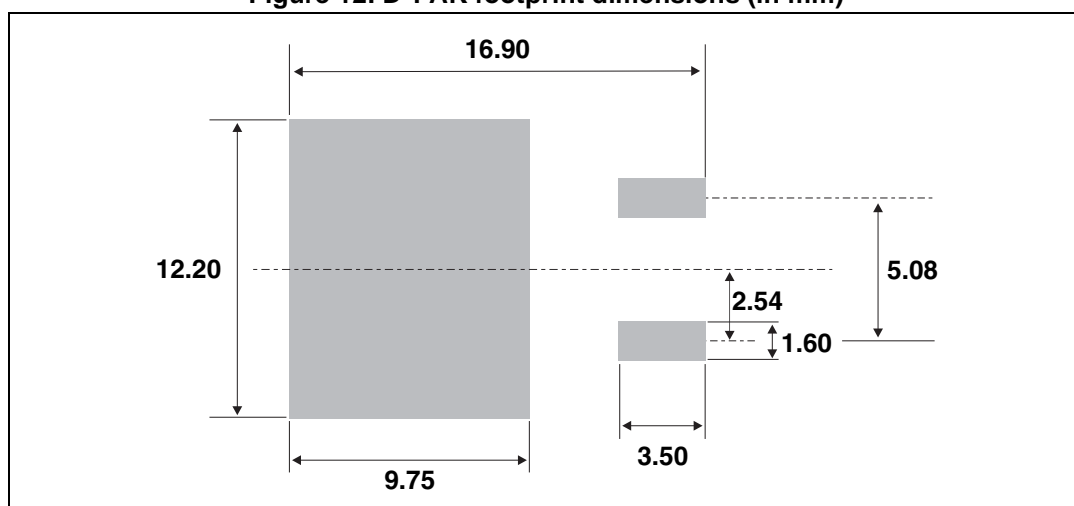


Figure 13. TO-220AB dimension definitions

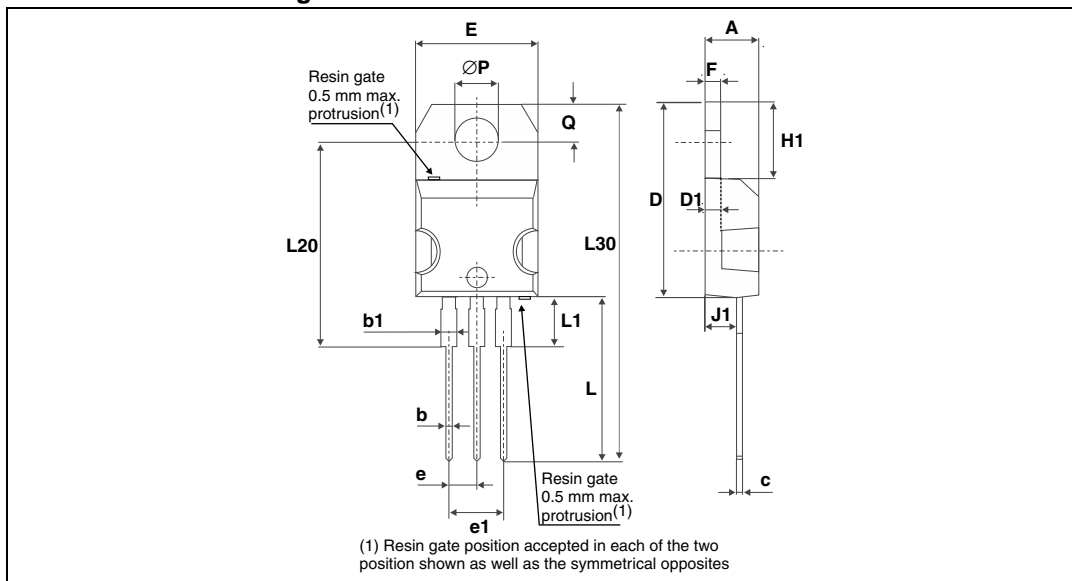


Table 6. TO-220AB dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.17	0.18
b	0.61	0.88	0.024	0.035
b1	1.14	1.70	0.045	0.067
c	0.48	0.70	0.019	0.027
D	15.25	15.75	0.60	0.62
D1	1.27 typ.		0.05 typ.	
E	10	10.40	0.39	0.41
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.19	0.20
F	1.23	1.32	0.048	0.052
H1	6.20	6.60	0.24	0.26
J1	2.40	2.72	0.094	0.107
L	13	14	0.51	0.55
L1	3.50	3.93	0.137	0.154
L20	16.40 typ.		0.64 typ.	
L30	28.90 typ.		1.13 typ.	
ØP	3.75	3.85	0.147	0.151
Q	2.65	2.95	0.104	0.116

Devices in I²PAK with nickel-plated back frame must NOT be mounted by frame soldering like SMDs. Such devices are intended to be through-hole mounted ONLY and in no circumstances shall ST be held liable for any lack of performance or damage arising out of soldering of nickel-plated back frames.

Figure 14. I²PAK dimension definitions

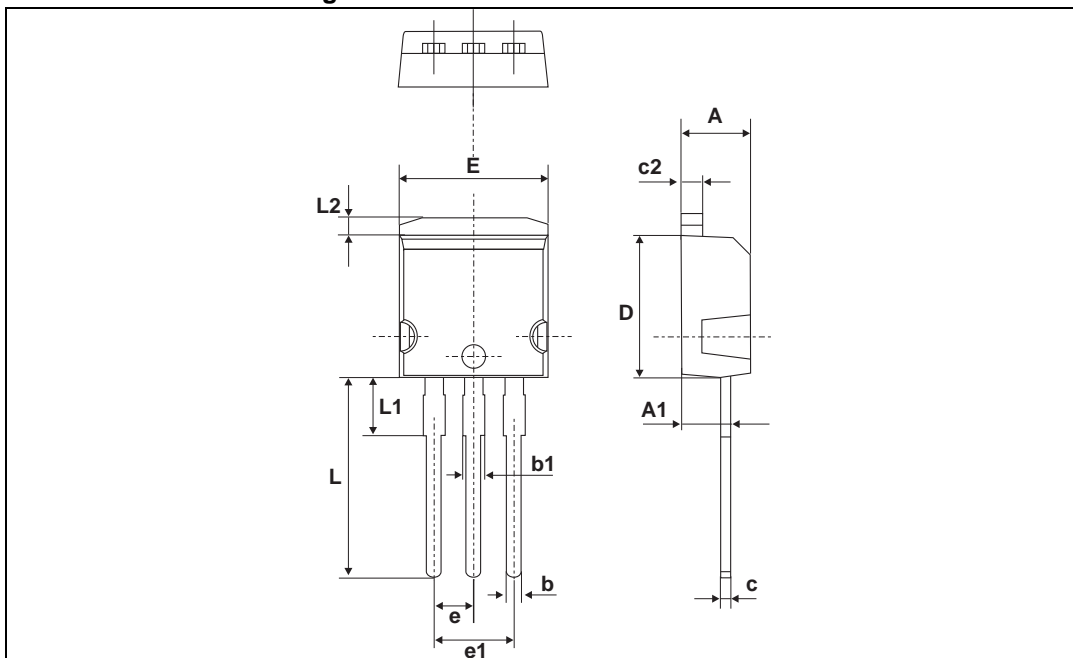


Table 7. I²PAK dimension values

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

Figure 15. TO-220FPAB dimension definitions

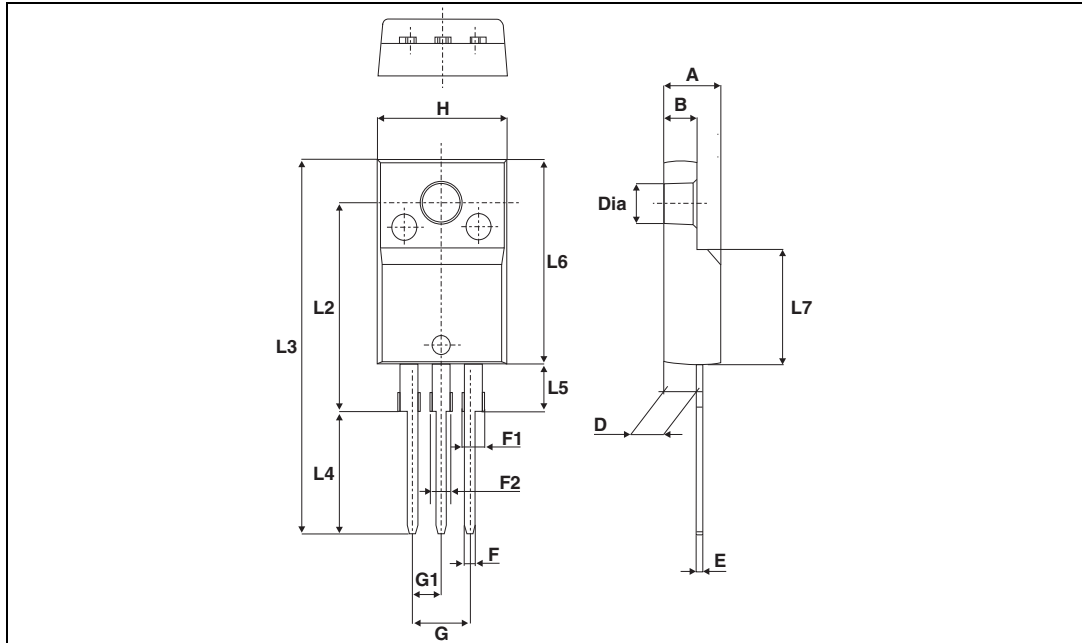


Table 8. TO-220FPAB dimension values

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

3 Ordering information

Table 9. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS2045CT	STPS2045CT	TO-220AB	2.23 g	50	Tube
STPS2045CR	STPS2045CR	I ² PAK	1.49 g	50	Tube
STPS2045CFP	STPS2045CFP	TO-220FPAB	2.0 g	50	Tube
STPS2045CG	STPS2045CG	D ² PAK	1.48 g	50	Tube
STPS2045CG-TR	STPS2045CG			1000	Tape and reel

4 Revision history

Table 10. Document revision history

Date	Revision	Changes
05-Oct-2004	4F	Last update
01-Dec-2004	5	Figure 16 (I ² PAK Package Mechanical Data): references b1 and b2 changed from 1.17mm to 1.70mm.
05-Feb-2010	6	Updated Table 2 (removed voltage). Updated ECOPACK statement. Updated Table 6.: <i>TO-220AB dimensions</i> .
05-Mar-2013	7	Updated Table 3
21-Oct-2014	8	Updated Features , Table 2 , Figure 3 and D ² PAK package information. Added Figure 9 . Removed fig 4,5 and 6 of version 7.

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