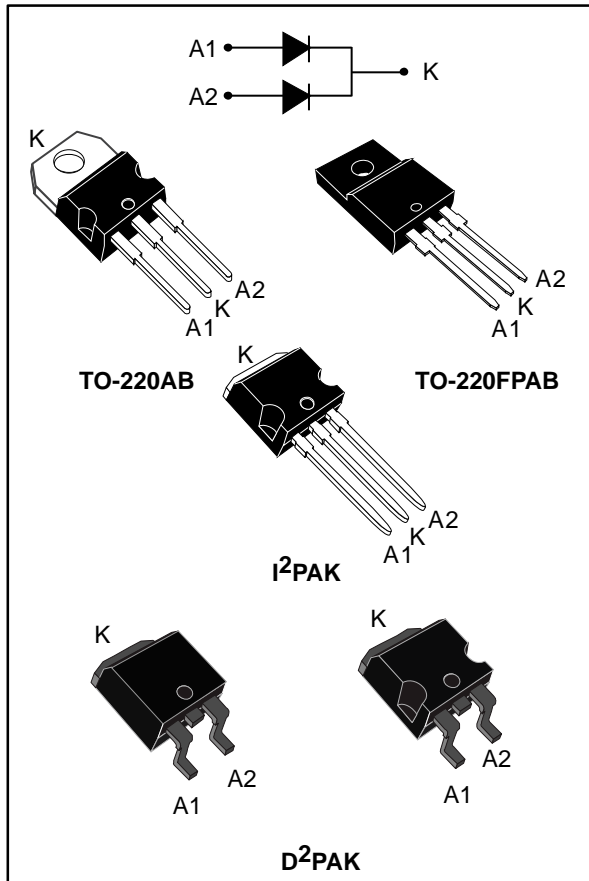


## High voltage power Schottky rectifier

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<sub>RMS</sub> 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 10 A
$V_{RRM}$	150 V
$T_j$ (max)	175 °C
$V_F$ (typ)	0.69 V

# 1 Characteristics

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

Symbol	Parameter			Value	Unit	
V <sub>RRM</sub>	Repetitive peak reverse voltage			150	V	
I <sub>F(RMS)</sub>	Forward rms current			30	A	
I <sub>F(AV)</sub>	Average forward current $\delta = 0.5$ , square wave	TO-220AB, D <sup>2</sup> PAK, I <sup>2</sup> PAK	T <sub>C</sub> = 155 °C	Per diode	10	A
		TO-220FPAB	T <sub>C</sub> = 135 °C			
		All types		Per device	20	
I <sub>FSM</sub>	Surge non repetitive forward current	t <sub>p</sub> = 10 ms sinusoidal		180	A	
P <sub>ARM</sub>	Repetitive peak avalanche power	t <sub>p</sub> = 10 μs, T <sub>j</sub> = 125 °C		480	W	
T <sub>stg</sub>	Storage temperature range			-65 to + 175	°C	
T <sub>j</sub>	Maximum operating junction temperature <sup>(1)</sup>			+ 175	°C	

**Notes:**

<sup>(1)</sup>(dP<sub>tot</sub>/dT<sub>j</sub>) < (1/R<sub>th(j-a)</sub>) condition to avoid thermal runaway for a diode on its own heatsink.

**Table 3: Thermal parameter**

Symbol	Parameter			Value	Unit
R <sub>th(j-c)</sub>	Junction to case	TO-220AB, D <sup>2</sup> PAK, I <sup>2</sup> PAK	Per diode	2.2	°C/W
		TO-220FPAB		4.5	
		TO-220AB, D <sup>2</sup> PAK, I <sup>2</sup> PAK	Total	1.3	
		TO-220FPAB		3.5	
R <sub>th(c)</sub>	Coupling	TO-220AB, D <sup>2</sup> PAK, I <sup>2</sup> PAK	-	0.3	°C/W
		TO-220FPAB		2.5	

When the diodes 1 and 2 are used simultaneously:

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

Table 4: Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ }^\circ\text{C}$	$V_R = V_{RRM}$	-		5.0	$\mu\text{A}$
		$T_j = 125\text{ }^\circ\text{C}$		-		5.0	$\text{mA}$
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ }^\circ\text{C}$	$I_F = 10\text{ A}$	-		0.92	V
		$T_j = 125\text{ }^\circ\text{C}$		-	0.69	0.75	
		$T_j = 25\text{ }^\circ\text{C}$	$I_F = 20\text{ A}$	-		1	
		$T_j = 125\text{ }^\circ\text{C}$		-	0.79	0.86	

**Notes:**

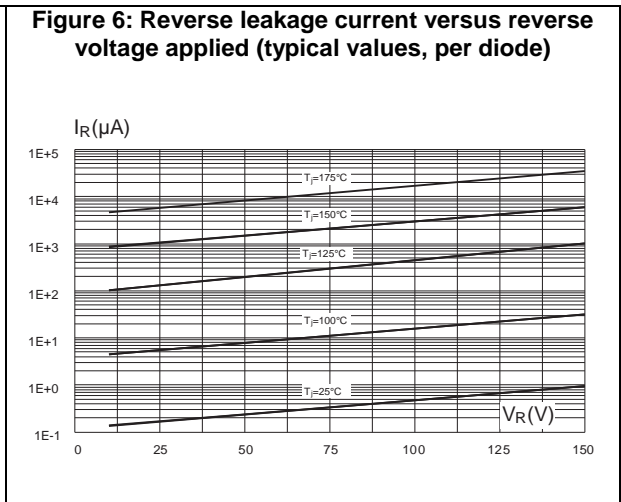
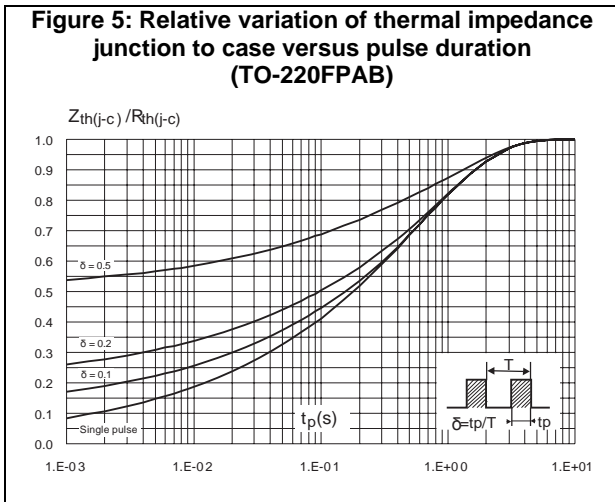
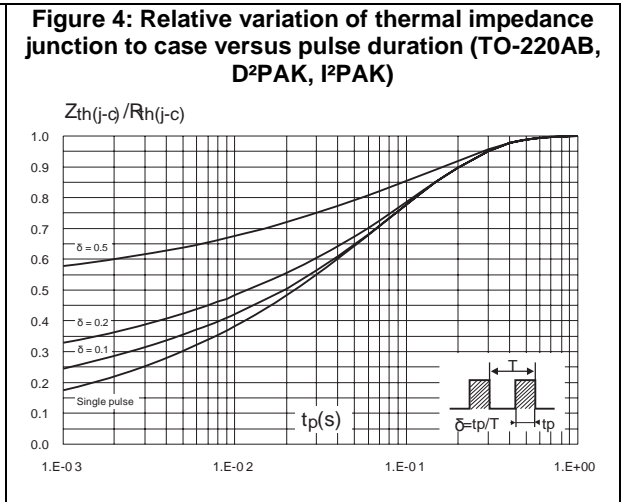
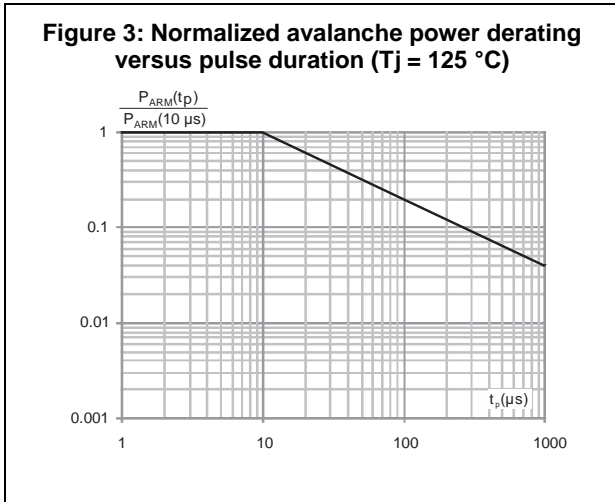
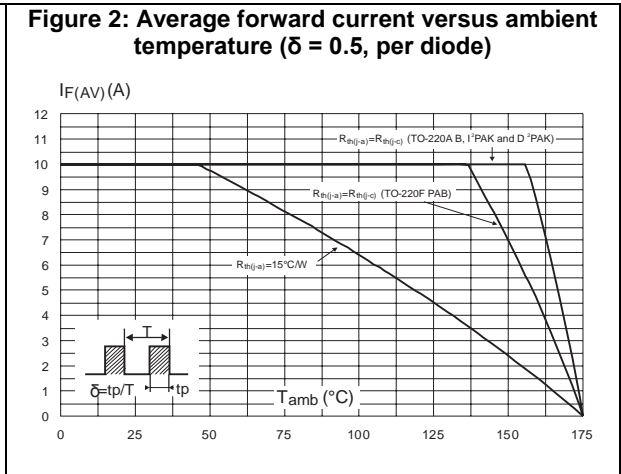
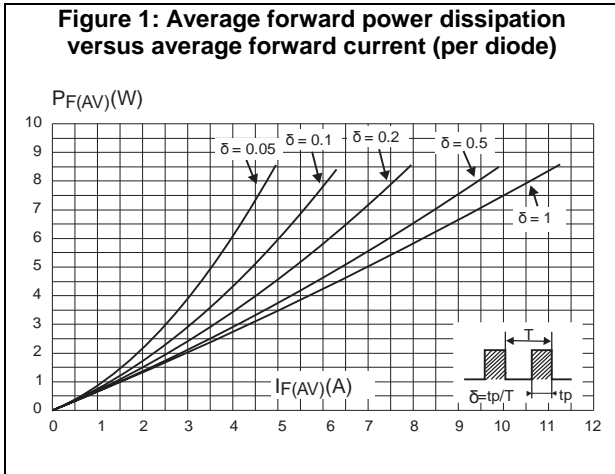
<sup>(1)</sup>Pulse test:  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

<sup>(2)</sup>Pulse test:  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

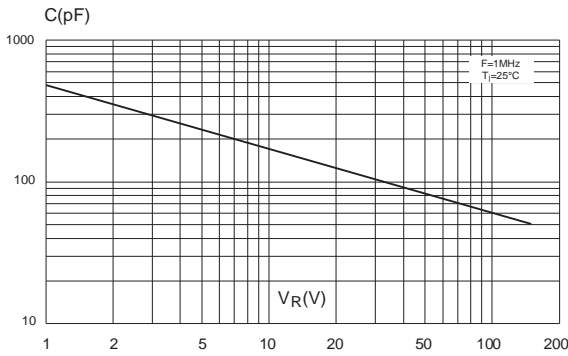
To evaluate the conduction losses use the following equation:

$$P = 0.64 \times I_{F(AV)} + 0.011 I_{F(RMS)}^2$$

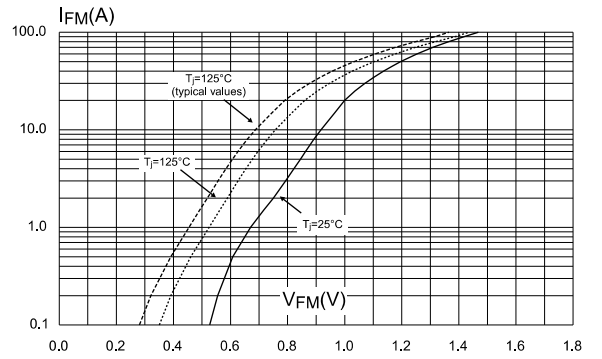
# 1.1 Characteristics (curves)



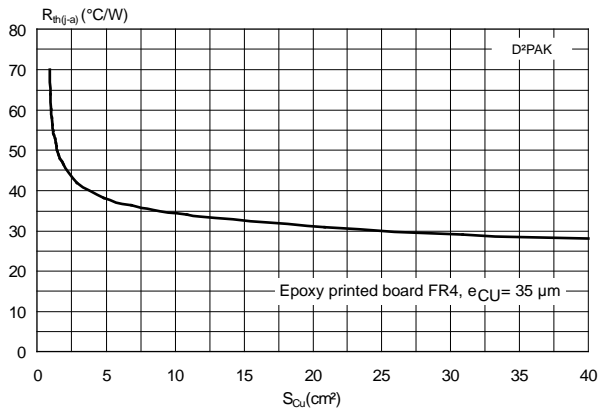
**Figure 7: Junction capacitance versus reverse voltage applied (typical values, per diode)**



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



**Figure 9: Thermal resistance junction to ambient versus copper surface under tab for D<sup>2</sup>PAK (typical values)**



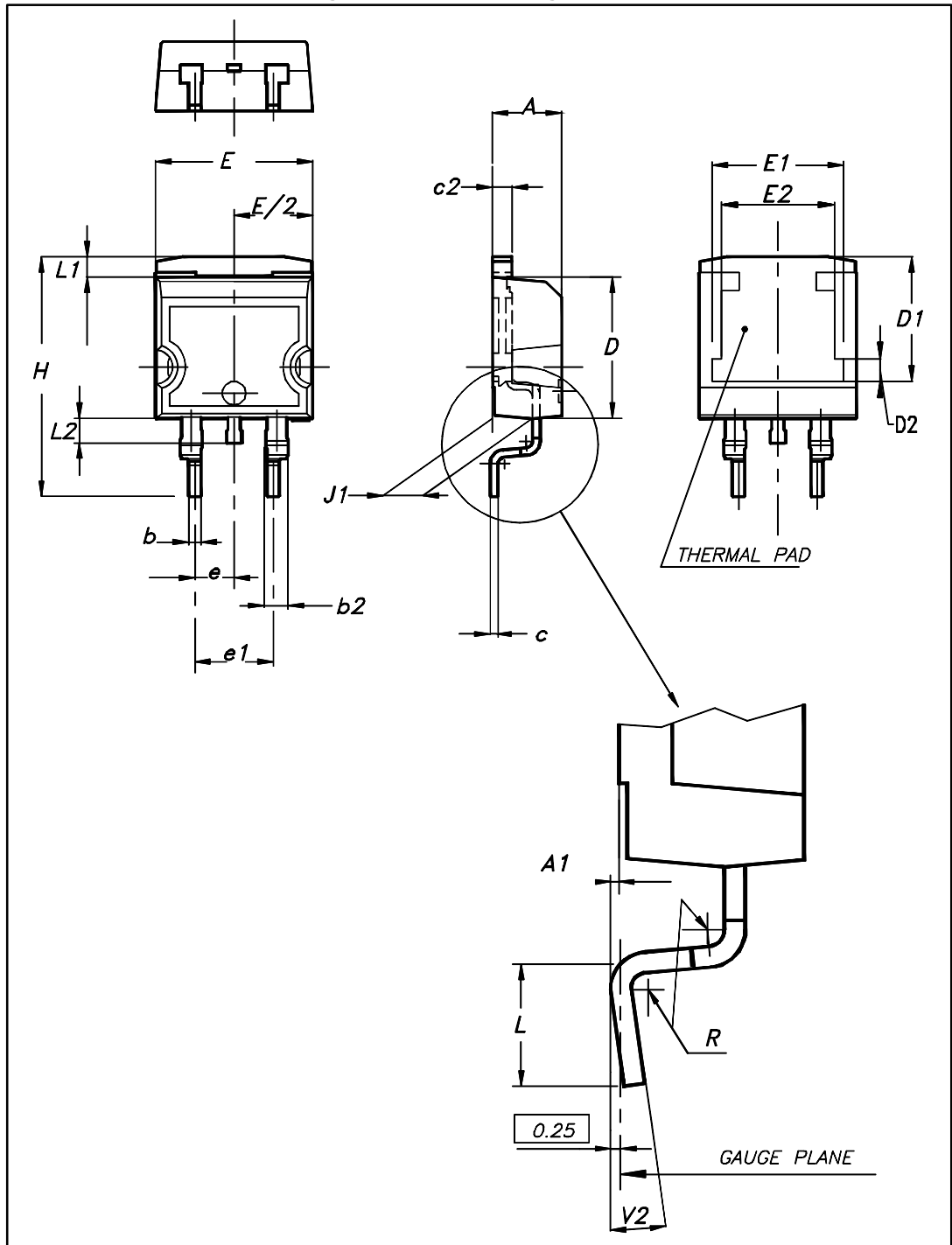
## 2 Package information

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](http://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-220AB and TO-220FPAB)
- Maximum torque value: 0.7 N·m (for TO-220AB and TO-220FPAB)

## 2.1 D<sup>2</sup>PAK package information

Figure 10: D<sup>2</sup>PAK package outline



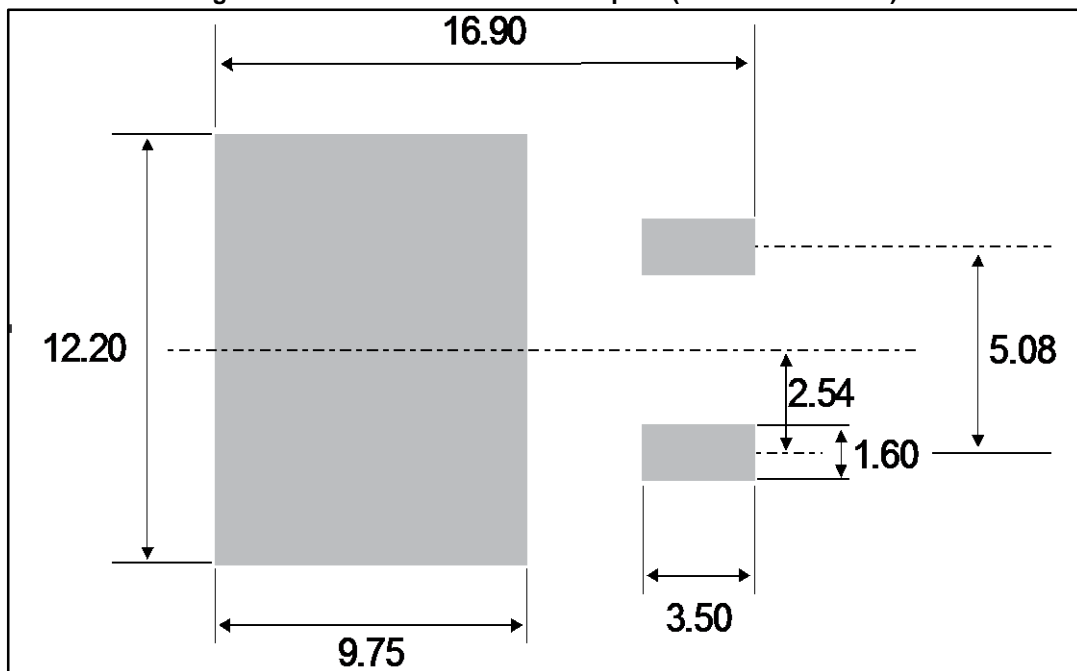
This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 5: D<sup>2</sup>PAK 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: D<sup>2</sup>PAK recommended footprint (dimensions in mm)



## 2.2 I<sup>2</sup>PAK package information

Figure 12: I<sup>2</sup>PAK package outline

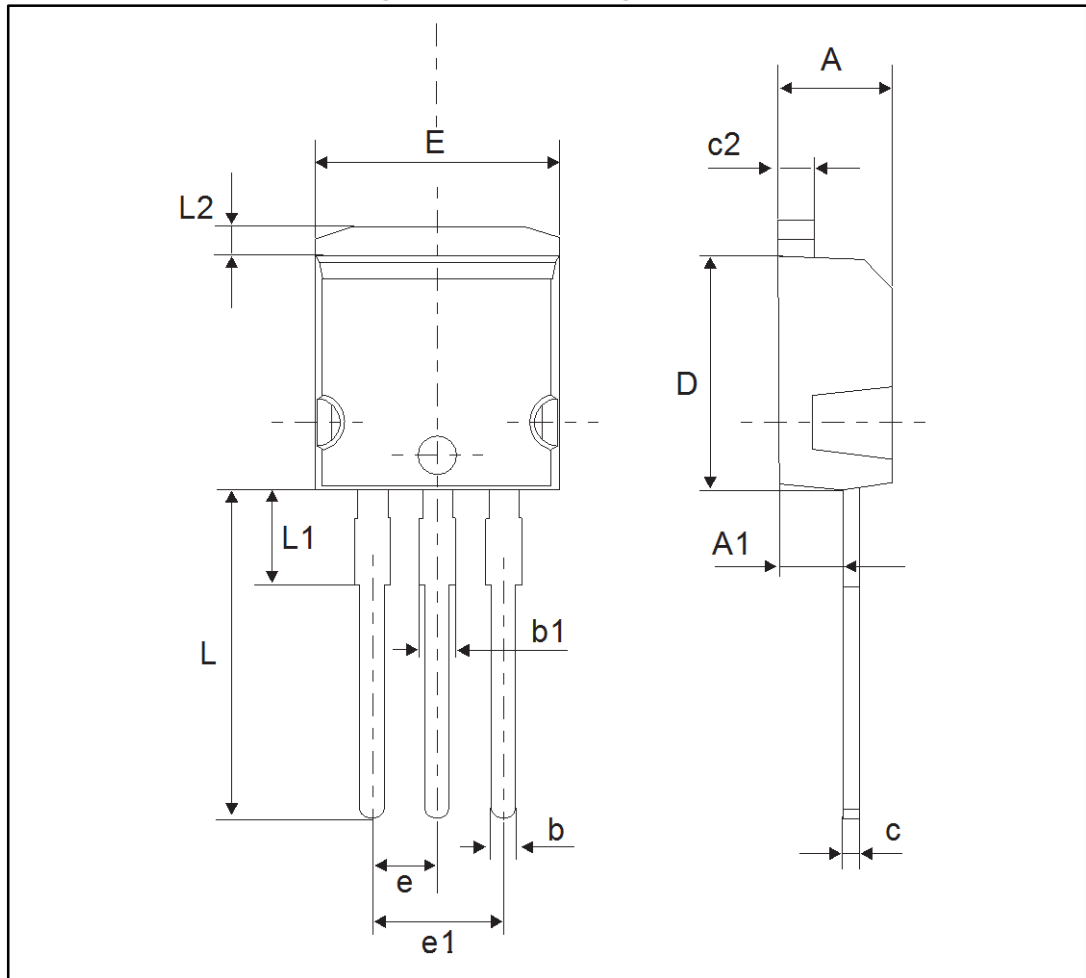


Table 6: I<sup>2</sup>PAK package mechanical data

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
F	0.75	1.0	0.03	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	2.40	2.70	0.094	0.106
H	10.00	10.40	0.393	0.409
L2	16.00 typ.		0.63 typ.	
L3	28.60	30.60	1.126	1.205
L4	9.80	10.6	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	3.0	3.20	0.118	0.126

Mounting (soldering) the I<sup>2</sup>PAK metal slug (heatsink) with alloy, like a surface mount device, IS NOT PERMITTED. A standard through-hole mounting is mandatory.

### 2.3 TO-220AB package information

Figure 13: TO-220AB package outline

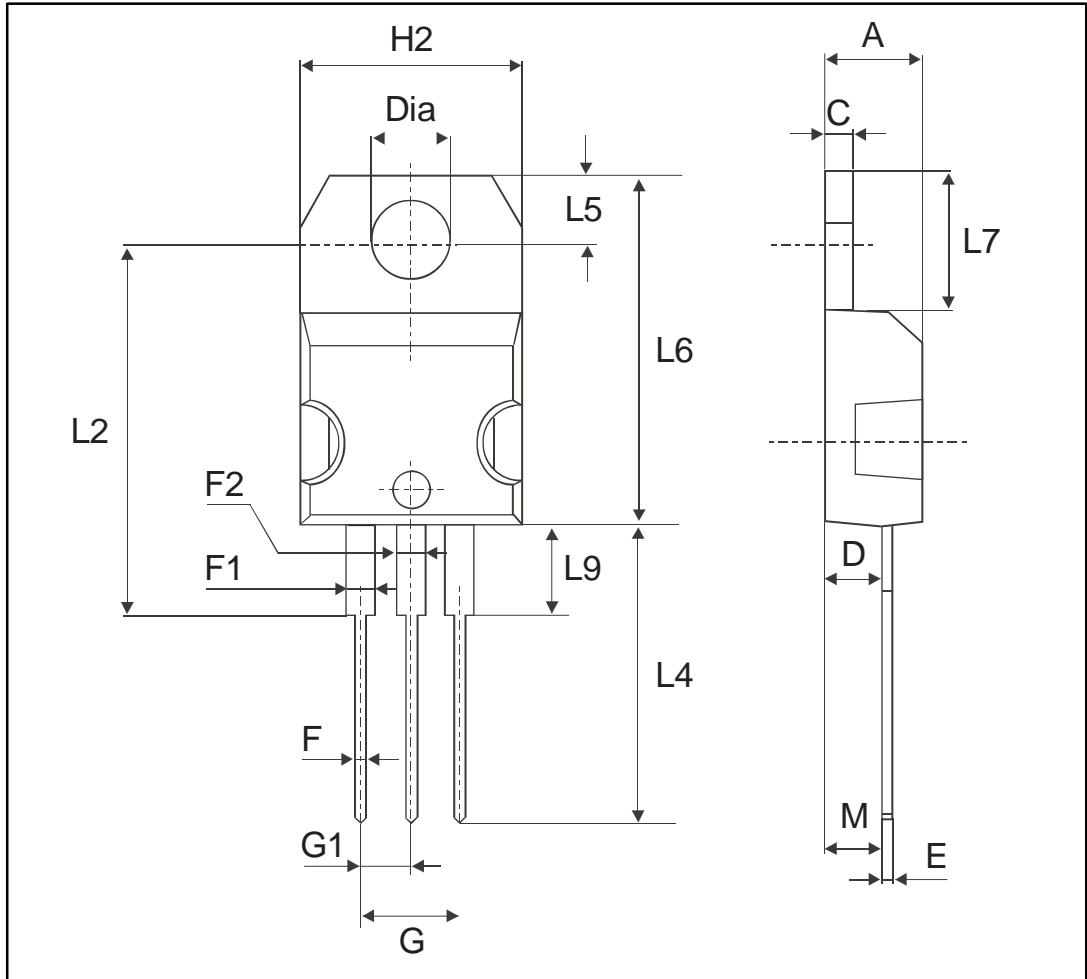


Table 7: TO-220AB package mechanical data

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
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	10.00	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

## 2.4 TO-220FPAB package information

Figure 14: TO-220FPAB package outline

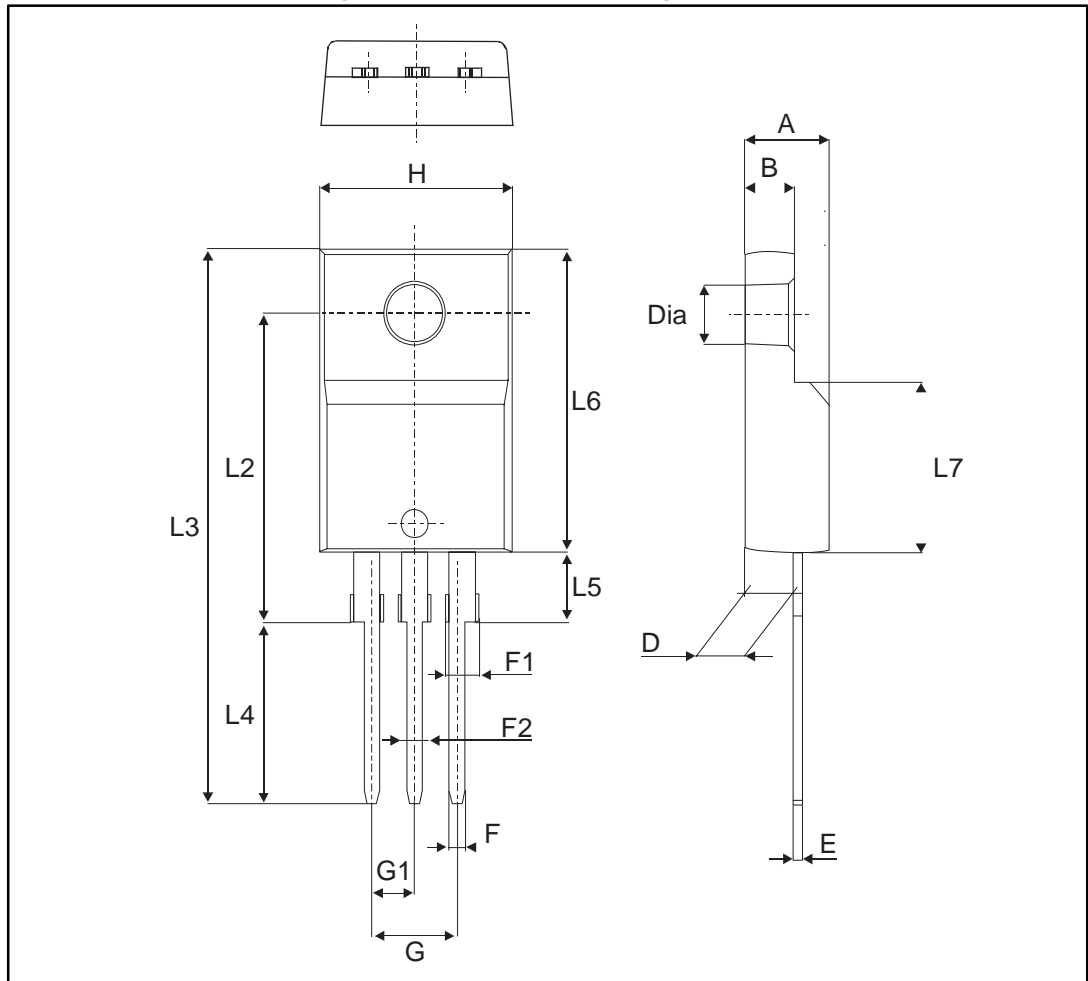


Table 8: TO-220FPAB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
B	2.5	2.7	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	1.0	0.03	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	2.40	2.70	0.094	0.106
H	10.00	10.40	0.393	0.409
L2	16.00 typ.		0.63 typ.	
L3	28.60	30.60	1.126	1.205
L4	9.80	10.6	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	3.0	3.20	0.118	0.126

### 3 Ordering information

Table 9: Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS20150CT	STPS20150CT	TO-220AB	1.95g	50	Tube
STPS20150CFP	STPS20150CFP	TO-220FPAB	1.9g	50	Tube
STPS20150CR	STPS20150CR	I <sup>2</sup> PAK	1.5g	50	Tube
STPS20150CG-TR	STPS20150CG	D <sup>2</sup> PAK	1.38g	1000	Tape and reel
STPS20150CG	STPS20150CG	D <sup>2</sup> PAK	1.38g	50	Tube

### 4 Revision history

Table 10: Document revision history

Date	Revision	Changes
Jul-2003	6D	Last update
31-May-2006	7	Reformatted to current standard. Added ECOPACK statement. Changed nF to pF in Figure 10.
07-Mar-2007	8	Reworked footnote to Table 1. Corrected typing error in Table 3.
28-Jan-2011	9	Updated weight in Table 9. Added warning paragraph above Table 6.
24-Aug-2015	10	Updated features, <a href="#">Table 1: "Device summary"</a> and packages silhouette in cover page. Updated <a href="#">Section 1: "Characteristics"</a> and <a href="#">Section 1.1: "Characteristics (curves)"</a> Updated <a href="#">Section 2.2: "D<sup>2</sup>PAK package information"</a> .



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