

### Description

This dual diode Schottky rectifier is suited for high frequency switched mode power supplies.

Packaged in DPAK, TO-220AB, TO-220AB narrow leads and I<sup>2</sup>PAK, this device is intended to be used in notebook and LCD adaptors, desktop SMPS, providing in these applications a margin between the remaining voltages applied on the diode and the voltage capability of the diode.

**Table 1. Device summary**

Symbol	Value
$I_{F(AV)}$	2 X 10 A
$V_{RRM}$	120 V
$T_j$ (max)	175 °C
$V_F$ (typ)	0.70 V

### Features

- High junction temperature capability
- Good trade-off between leakage current and forward voltage drop
- Low leakage current
- Avalanche capability specified
- ECOPACK<sup>®2</sup> compliant component for DPAK on demand

# 1 Characteristics

**Table 2. Absolute ratings (limiting values per diode at T<sub>amb</sub> = 25 °C unless otherwise stated)**

Symbol	Parameter		Value	Unit
V <sub>RRM</sub>	Repetitive peak reverse voltage		120	V
I <sub>F(RMS)</sub>	Forward rms current		30	A
I <sub>F(AV)</sub>	Average forward current, δ = 0.5, square wave	T <sub>c</sub> = 150 °C per diode	10	A
		T <sub>c</sub> = 145 °C per device	20	
I <sub>FSM</sub>	Surge non repetitive forward current	t <sub>p</sub> = 10 ms sinusoidal	150	A
P <sub>ARM</sub>	Repetitive peak avalanche power	t <sub>p</sub> = 10 μs, T <sub>j</sub> = 125 °C	330	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

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

**Table 3. Thermal parameters**

Symbol	Parameter		Max. value	Unit
R <sub>th(j-c)</sub>	Junction to case	per diode	3	°C/W
		total	1.8	
R <sub>th(c)</sub>	Coupling		0.6	

When the two diodes 1 and 2 are used simultaneously:

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

**Table 4. Static electrical characteristics (per diode)**

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
I <sub>R</sub> <sup>(1)</sup>	Reverse leakage current	T <sub>j</sub> = 25 °C	V <sub>R</sub> = V <sub>RRM</sub>	-		10	μA
		T <sub>j</sub> = 125 °C		-	1.5	5	mA
V <sub>F</sub> <sup>(2)</sup>	Forward voltage drop	T <sub>j</sub> = 25 °C	I <sub>F</sub> = 2.5 A	-		0.70	V
		T <sub>j</sub> = 125 °C		-	0.54	0.58	
		T <sub>j</sub> = 25 °C	I <sub>F</sub> = 10 A	-		0.92	
		T <sub>j</sub> = 125 °C		-	0.70	0.74	
		T <sub>j</sub> = 25 °C	I <sub>F</sub> = 20 A	-		1.02	
		T <sub>j</sub> = 125 °C		-	0.81	0.86	

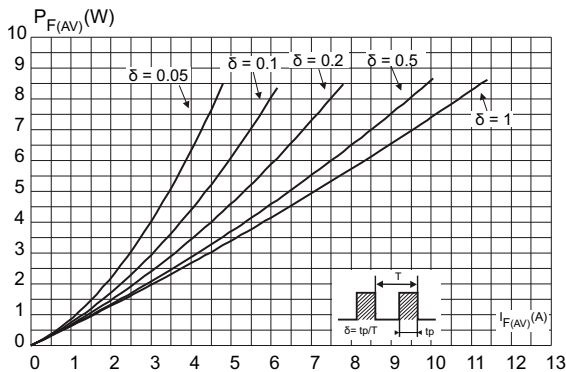
1. Pulse test: t<sub>p</sub> = 5 ms, δ < 2%

2. Pulse test: t<sub>p</sub> = 380 μs, δ < 2%

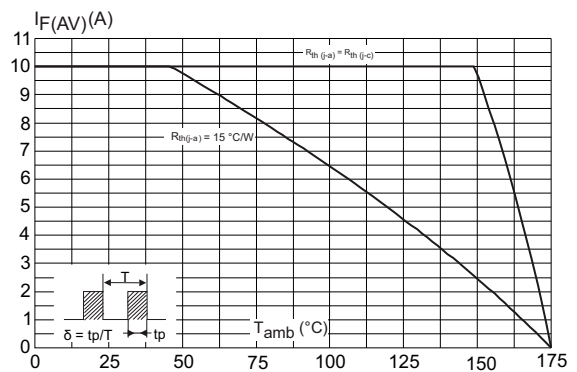
To evaluate the conduction losses, use the following equation:

$$P = 0.62 \times I_{F(AV)} + 0.012 \times I_{F(RMS)}^2$$

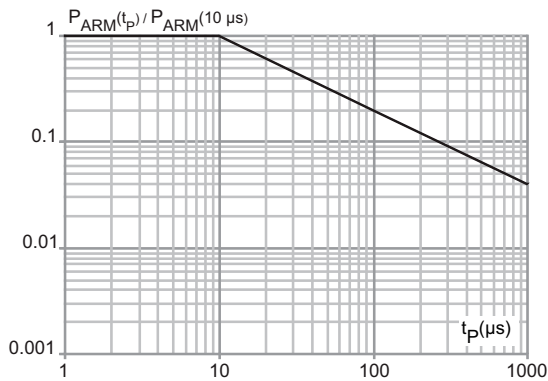
**Figure 1. Average forward power dissipation versus average forward current (per diode)**



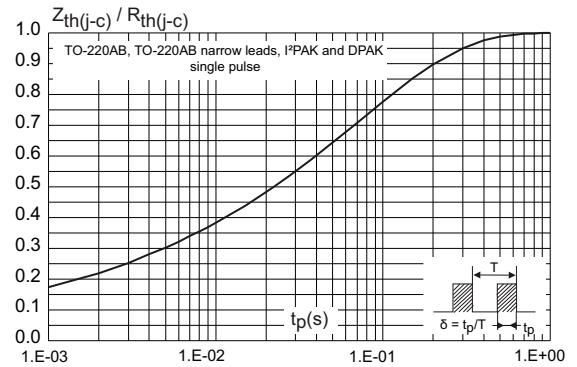
**Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)**



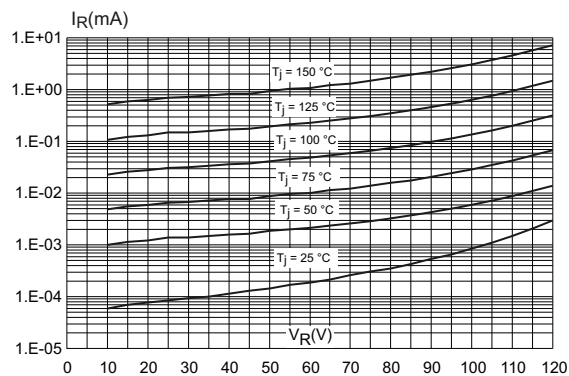
**Figure 3. Normalized avalanche power derating versus pulse duration ( $T_j = 125^\circ\text{C}$ )**



**Figure 4. Relative variation of thermal impedance junction to case versus pulse duration**



**Figure 5. Reverse leakage current versus reverse voltage applied (typical values, per diode)**



**Figure 6. Junction capacitance vs. reverse voltage applied (typical values, per diode)**

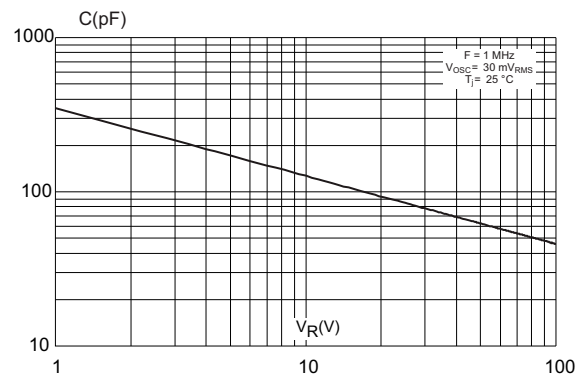


Figure 7. Forward voltage drop versus forward current (per diode)

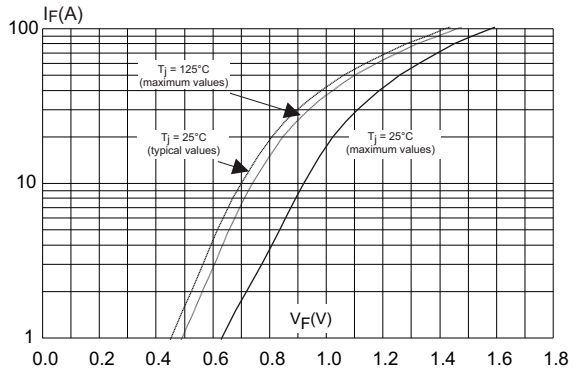
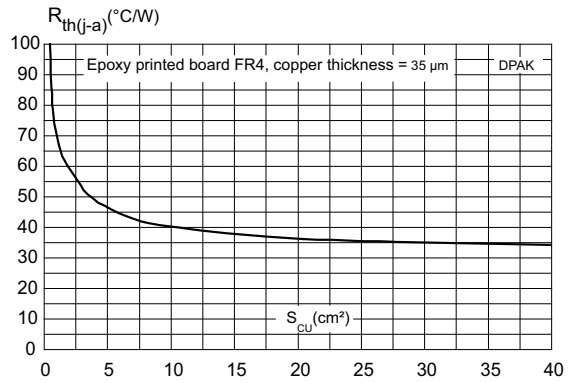


Figure 8. Thermal resistance junction to ambient versus copper surface under tab



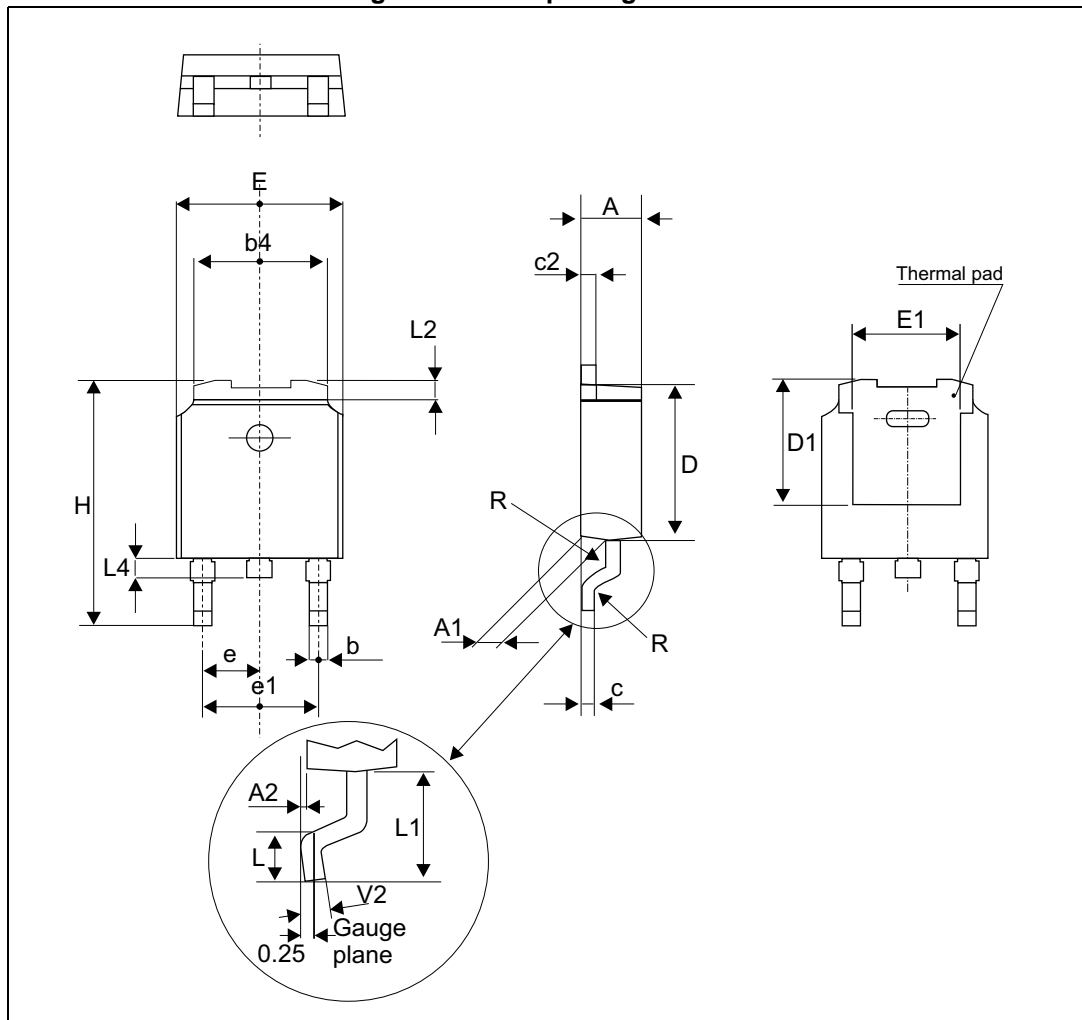
## 2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m (TO-220AB, TO-220AB narrow leads)
- Maximum torque value: 0.7 N·m (TO-220AB, TO-220AB narrow leads)

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.

### 2.1 DPAK package information

Figure 9. DPAK package outline

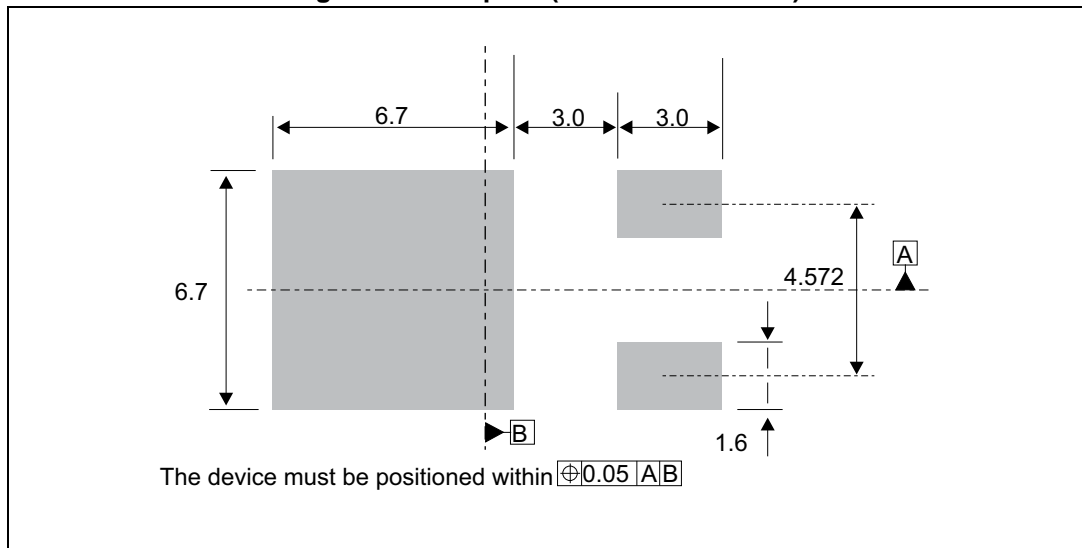


*Note:* This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 5. DPAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.18		2.40	0.085		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
b	0.64		0.90	0.025		0.035
b4	4.95		5.46	0.194		0.214
c	0.46		0.61	0.018		0.024
c2	0.46		0.60	0.018		0.023
D	5.97		6.22	0.235		0.244
D1	4.95		5.60	0.194		0.220
E	6.35		6.73	0.250		0.264
E1	4.32		5.50	0.170		0.216
e		2.28			0.090	
e1	4.40		4.70	0.173		0.185
H	9.35		10.40	0.368		0.409
L	1.00		1.78	0.039		0.070
L2			1.27			0.050
L4	0.60		1.02	0.023		0.040
V2	-8°		+8°	-8°		8°

Figure 10. Footprint (dimensions in mm)



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

Figure 11. I<sup>2</sup>PAK package outline

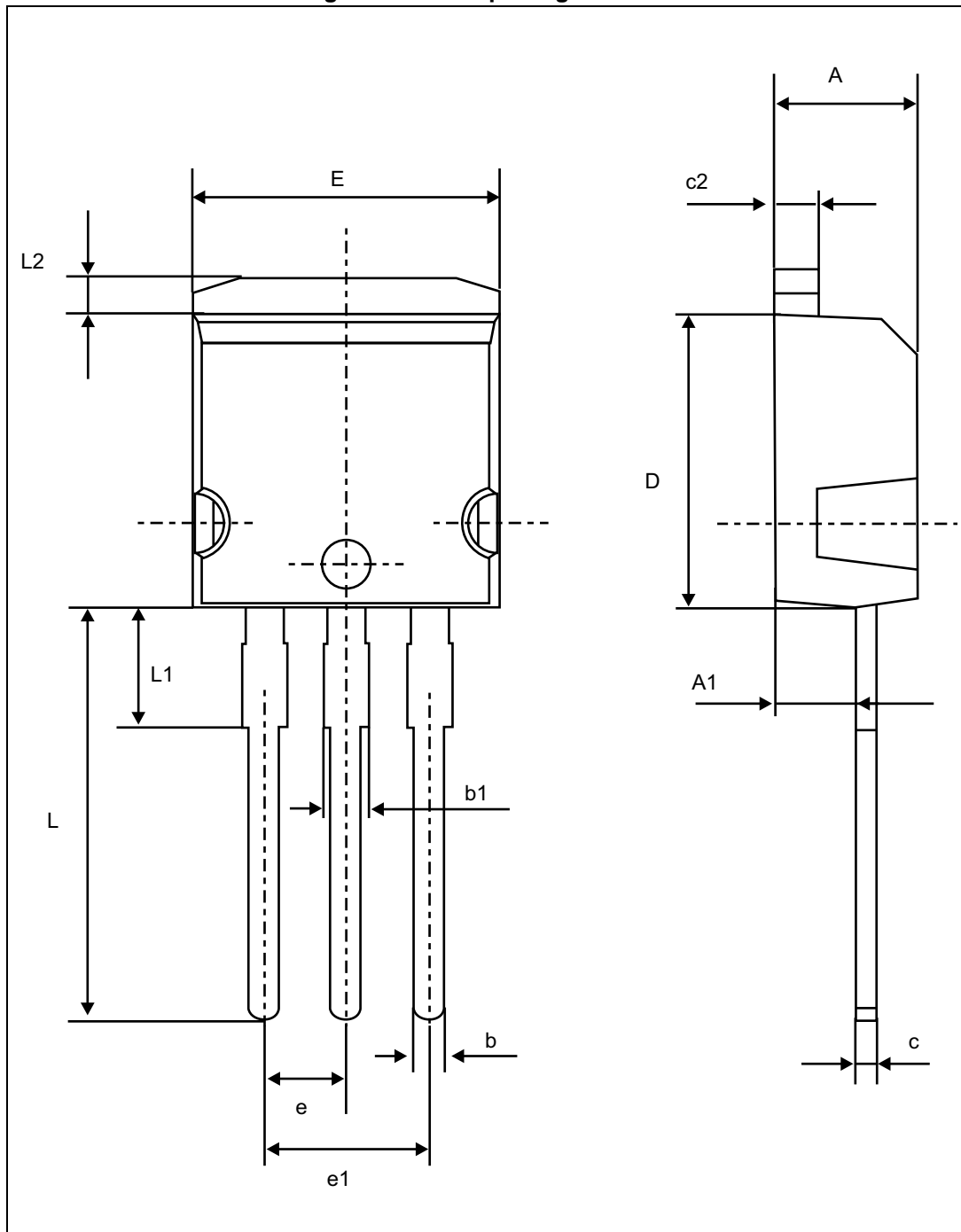


Table 6. I<sup>2</sup>PAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	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	10.00		10.40	0.394		0.409
L	13.00		14.00	0.512		0.551
L1	3.50		3.93	0.138		0.155
L2	1.27		1.40	0.050		0.055



### 2.3 TO-220AB package information

Figure 12. TO-220AB package outline

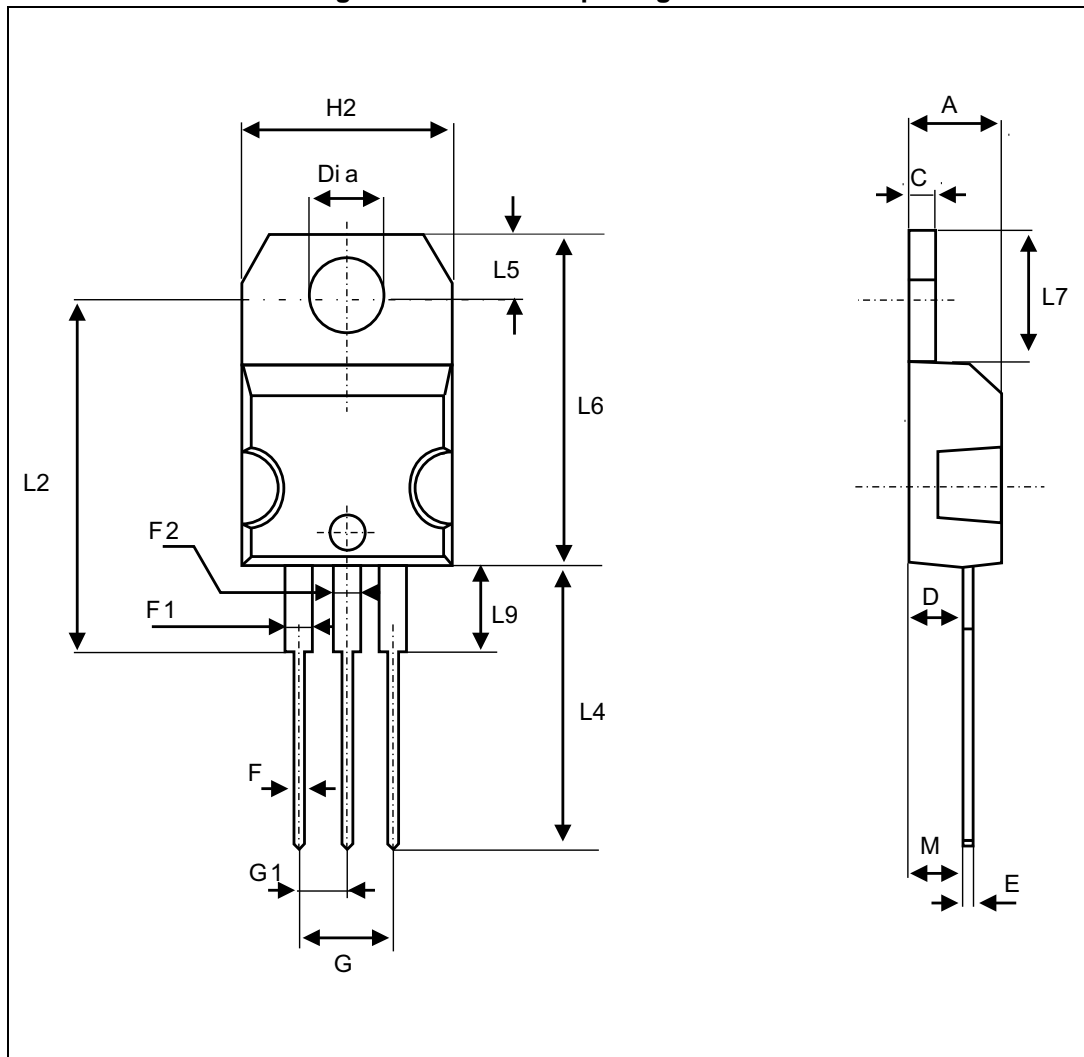


Table 7. TO-220AB package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	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		16.4 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-220AB narrow leads package information

Figure 13. TO-220AB narrow leads package outline

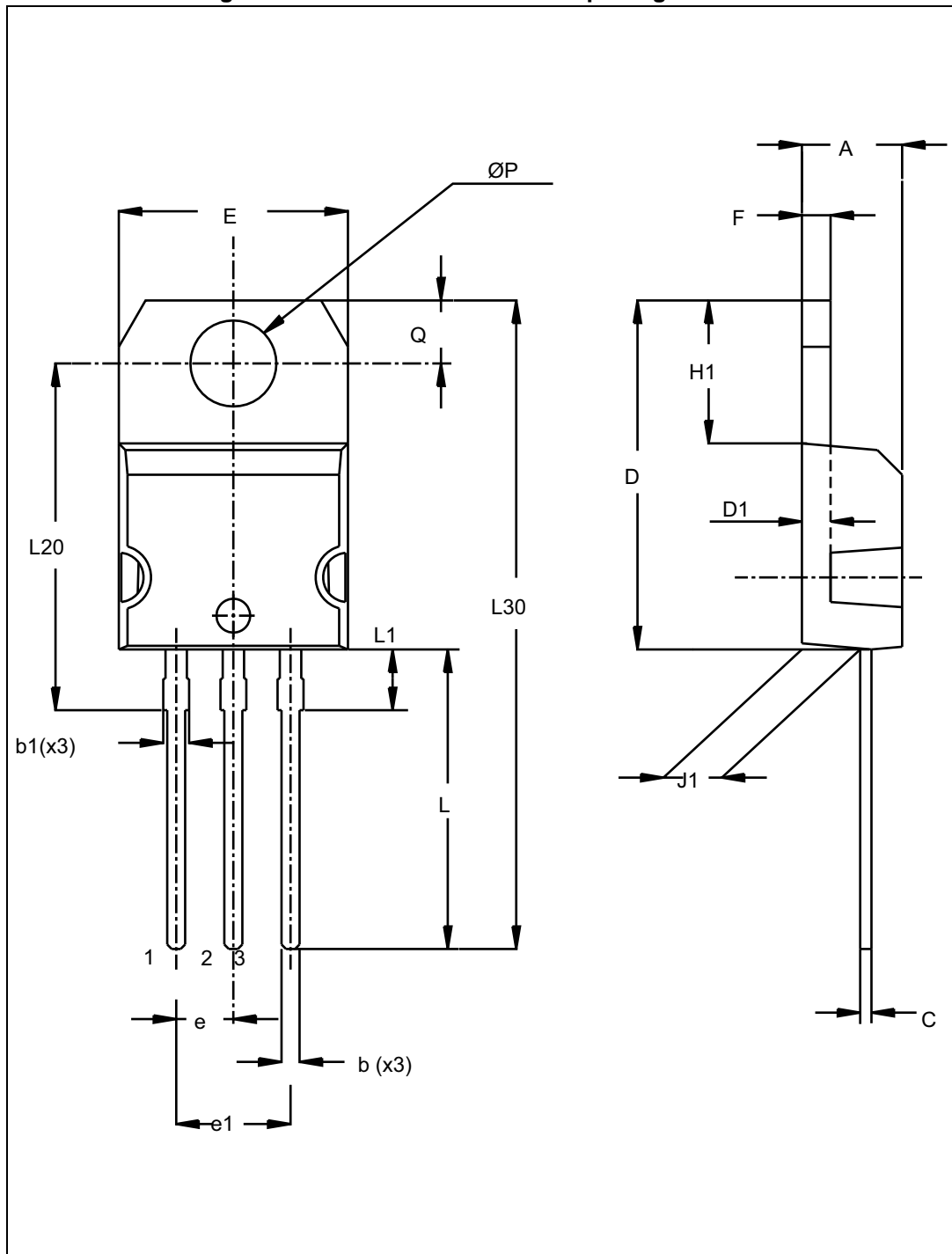


Table 8. TO-220AB narrow leads package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.173		0.181
b	0.61		0.88	0.024		0.034
b1	0.95		1.20	0.037		0.047
c	0.48		0.70	0.019		0.027
D	15.25		15.75	0.600		0.620
D1		1.27			0.050	
E	10.00		10.40	0.393		0.409
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.194		0.202
F	1.23		1.32	0.048		0.052
H1	6.20		6.60	0.244		0.259
J1	2.40		2.72	0.095		0.107
L	13.00		14.00	0.511		0.551
L1	2.60		2.90	0.102		0.114
L20		15.40			0.606	
L30		28.90			1.137	
∅P	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116

### 3 Ordering information

**Table 9. Ordering information**

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STPS20120CT	STPS20120CT	TO-220AB	1.9 g	50	Tube
STPS20120CR	STPS20120CR	I <sup>2</sup> PAK	1.5 g	50	Tube
STPS20120CB-TR	PS20 120CB	DPAK	0.32 g	2500	Tape and reel
STPS20120CTN	STPS20120CTN	TO-220AB narrow leads	1.9 g	50	Tube

### 4 Revision history

**Table 10. Document revision history**

Date	Revision	Changes
18-Feb-2005	1	First issue
03-May-2007	2	Reformatted to current standards. Added TO-220FPAB package.
15-Jun-2012	3	Added TO-220 narrow leads package.
02-Nov-2016	4	Added DPAK package and removed TO-220FPAB package. Reformatted to current standard.

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