1 Characteristics

Table 1. 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-220AB, D^2PAK, I^2PAK	T_C = 155 °C	Per diode	10	A
		TO-220FPAB	T_C = 135 °C	Per diode		
		All types		Per device	20	
I_{FSM}	Surge non repetitive forward current	tp = 10 ms sinusoidal			180	A
P_{ARM}	Repetitive peak avalanche power	tp = 10 µs, T_j= 125 °C			480	W
T_{stg}	Storage temperature range				-65 to + 175	°C
T_j	Maximum operating junction temperature (1)				+ 175	°C

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

Table 2. Thermal parameter

Symbol	Parameter			Value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AB, D^2PAK, I^2PAK	Per diode	2.2	°C/W
		TO-220FPAB		4.5	
		TO-220AB, D^2PAK, I^2PAK	Total	1.3	
		TO-220FPAB		3.5	
$R_{th(c)}$	Coupling	TO-220AB, D^2PAK, I^2PAK	-	0.3	°C/W
		TO-220FPAB		2.5	

When the diodes 1 and 2 are used simultaneously :
$\Delta Tj(diode\ 1) = P(diode1) \times R_{th(j-c)}(Per\ diode) + P(diode\ 2) \times R_{th(c)}$

Table 3. Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-		5.0	µA
		T_j = 125 °C		-		5.0	mA
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 10 A	-		0.92	V
				-	0.69	0.75	
			I_F = 20A	-		1.0	
				-	0.79	0.86	

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

1.1 Characteristics (curves)

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

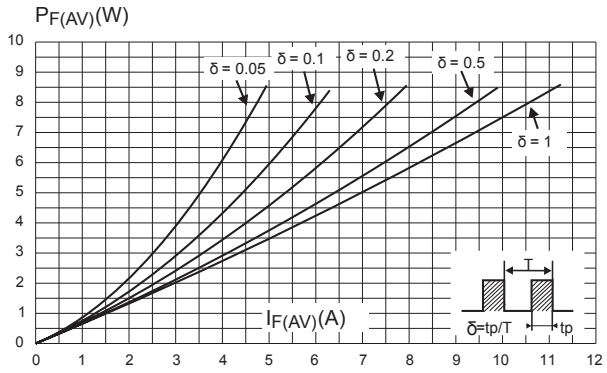


Figure 2. Average forward current versus ambient temperature (δ= 0.5, per diode)

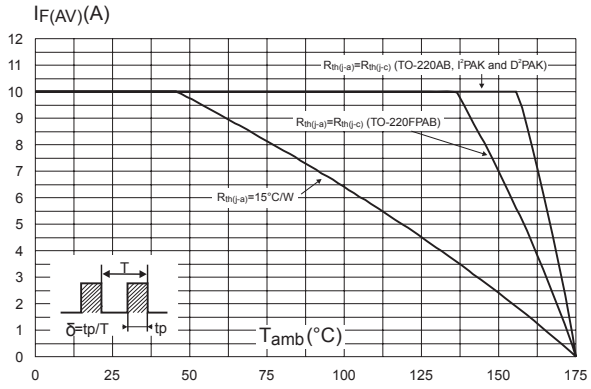


Figure 3. Normalized avalanche power derating versus pulse (T_j= 125 °C)

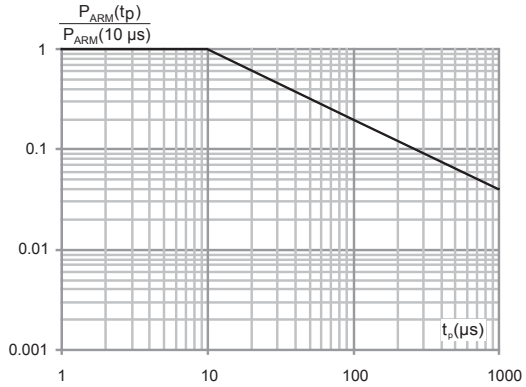


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration (per diode)

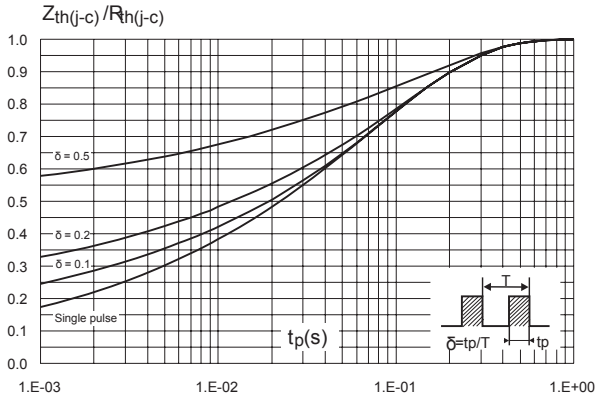


Figure 5. Relative variation of thermal impedance junction to case versus pulse duration (per diode)

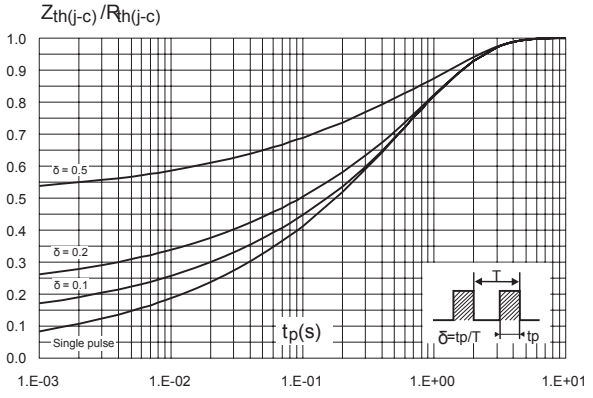


Figure 6. Reverse leakage current versus reverse voltage applied (typical values, per diode)

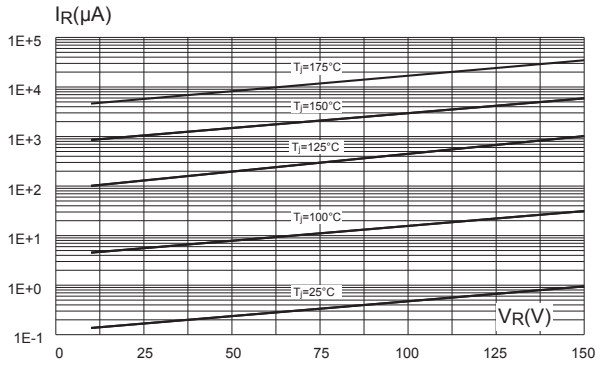


Figure 7. Junction capacitance versus reverse voltage applied (typical values, per diode)

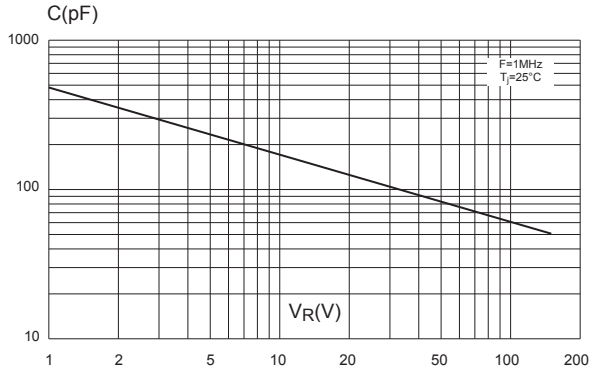


Figure 8. Forward voltage drop versus forward current (maximum values, per diode)

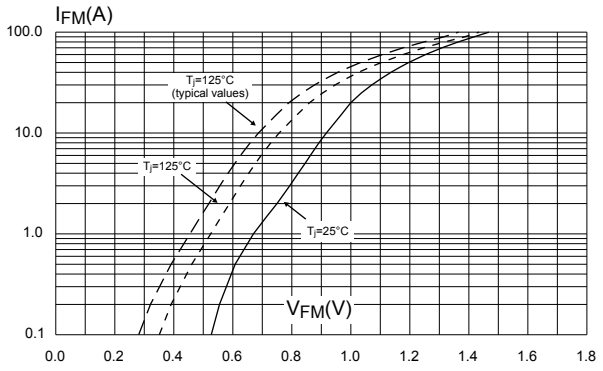
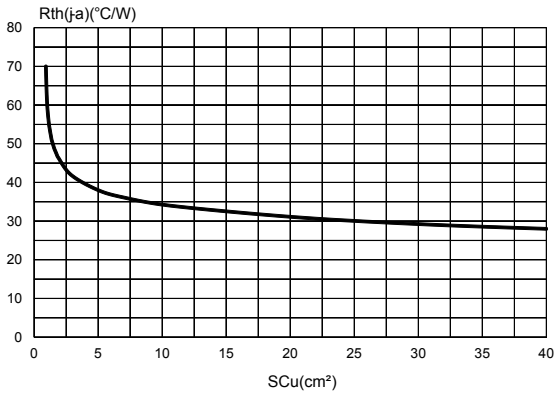


Figure 9. Thermal resistance junction to ambient versus copper surface under tab (epoxy printed board FR4, e_{Cu} = 35 µm) (D²PAK)



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.

2.1 D²PAK package information

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0

Figure 10. D²PAK package outline

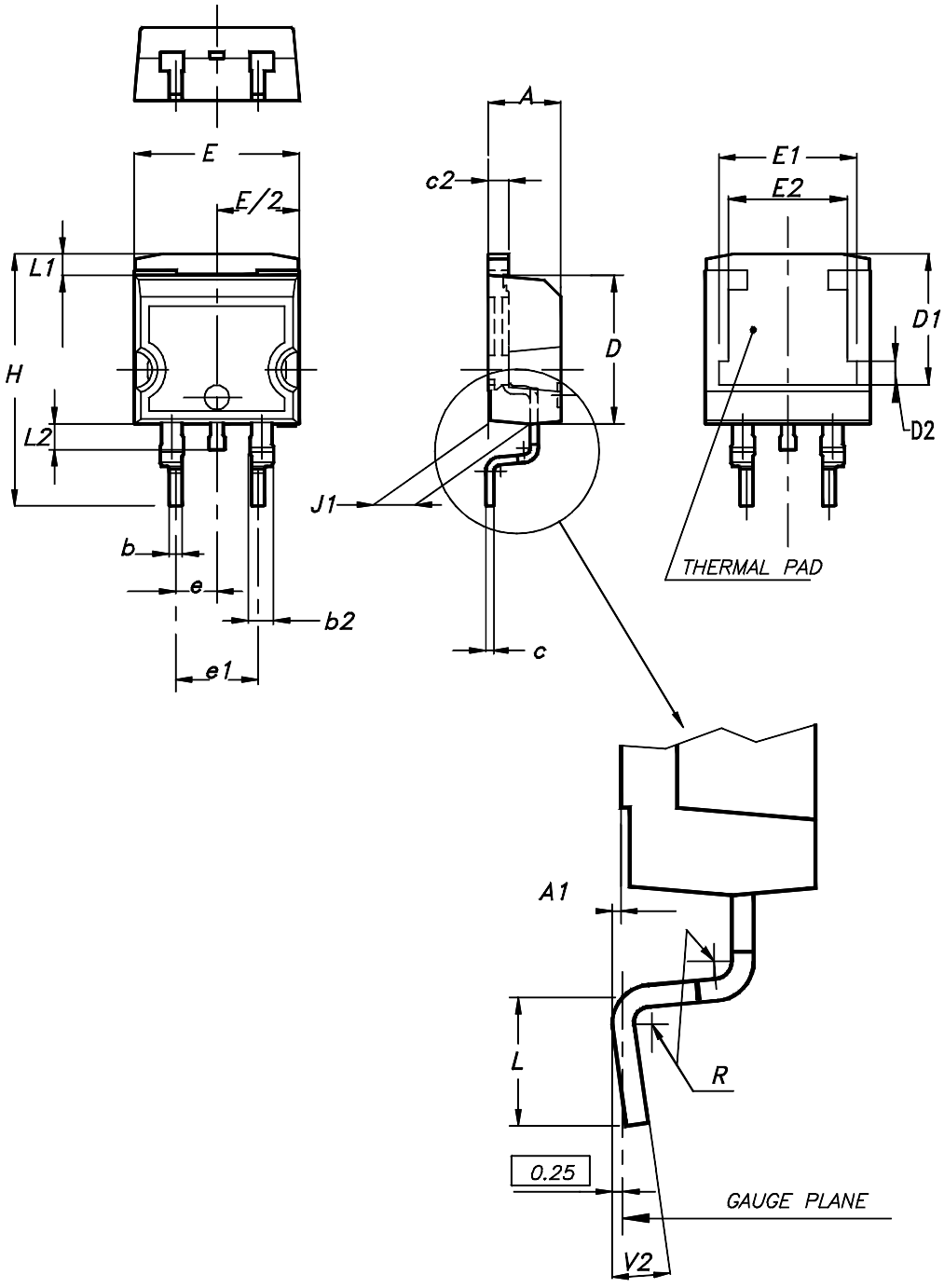
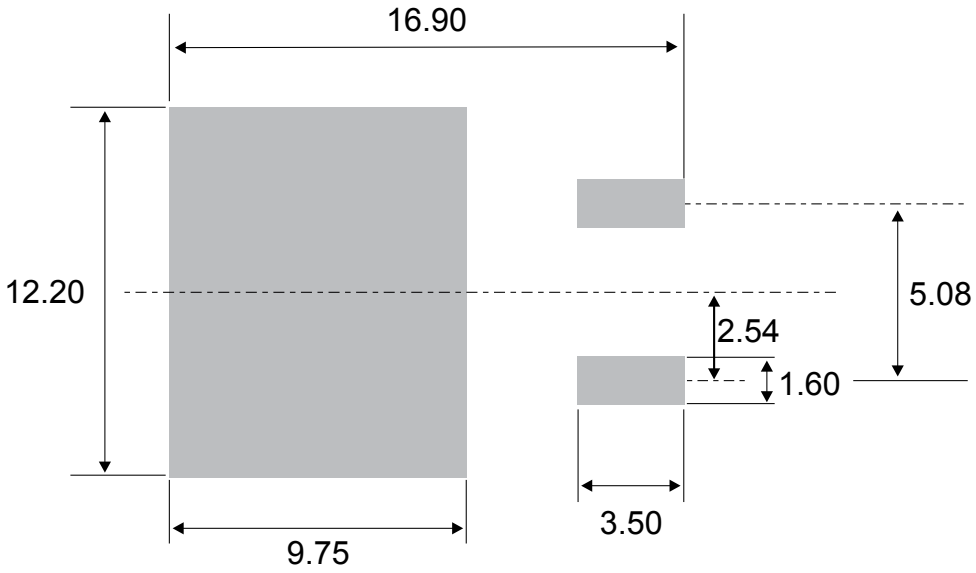


Table 4. **D²PAK package mechanical data**

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



2.2 I²PAK package information

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0

Figure 12. I²PAK package outline

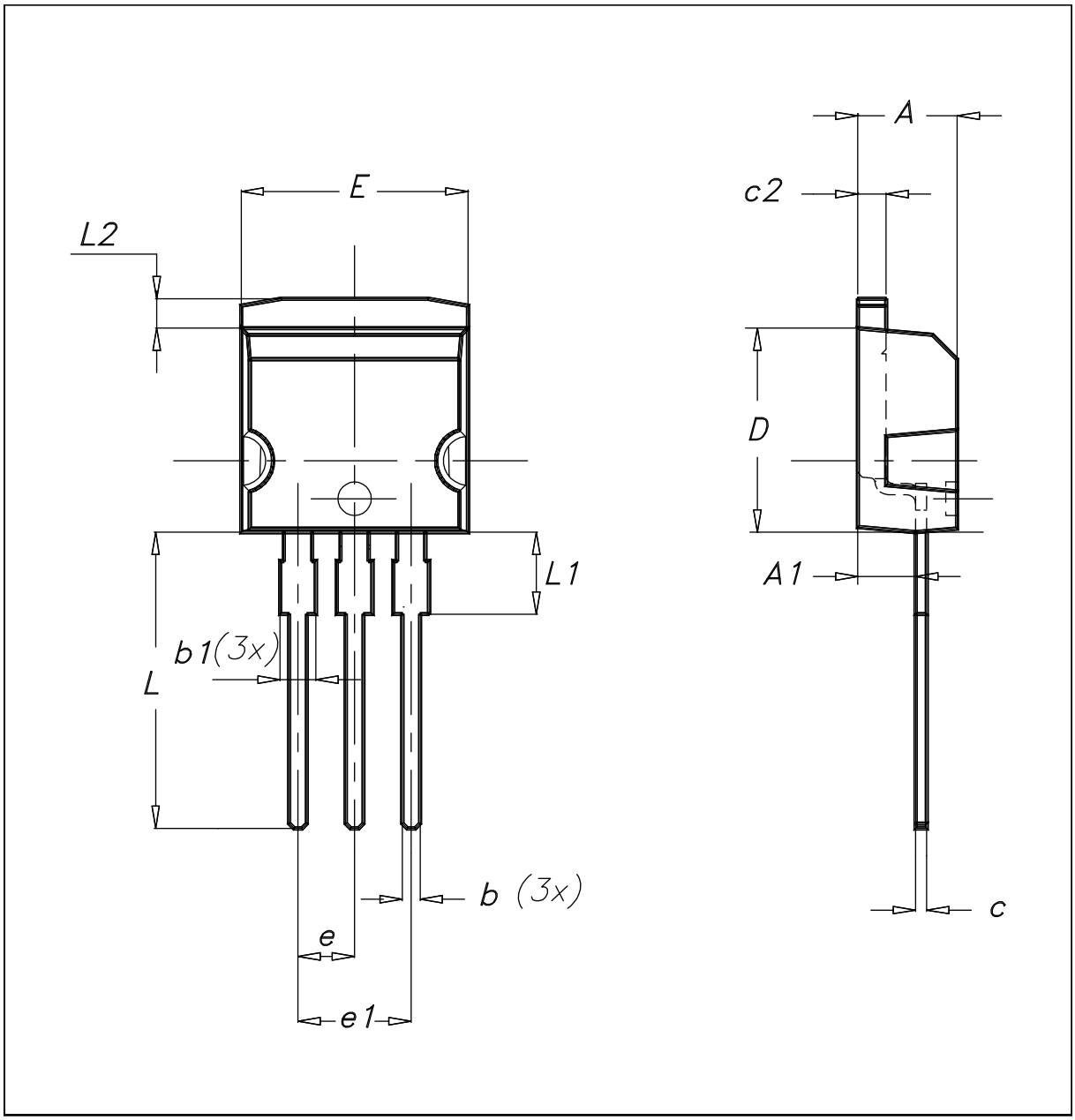


Table 5. I²PAK package mechanical data

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
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

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

Figure 13. TO-220AB package outline

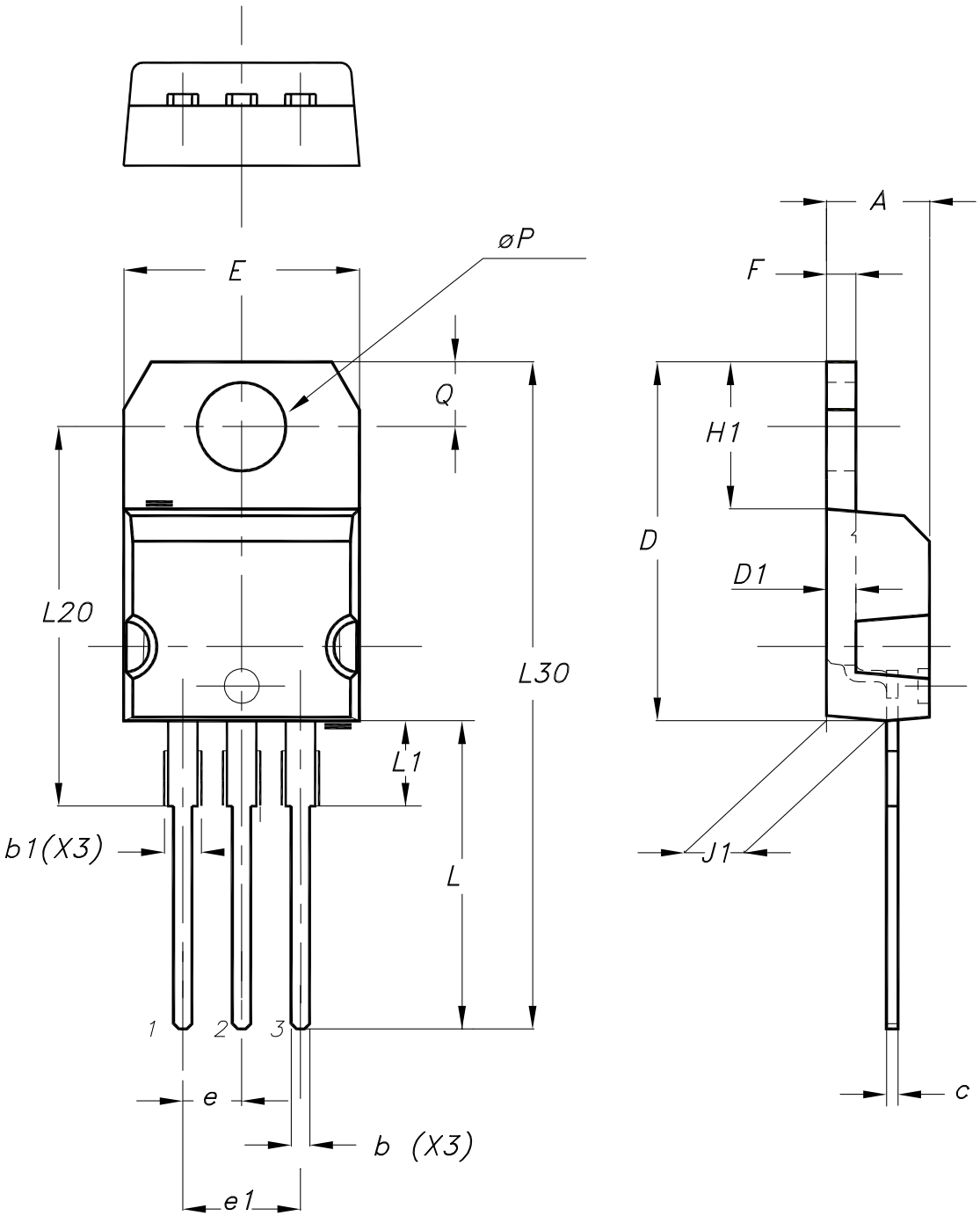


Table 6. TO-220AB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
b	0.61	0.88	0.240	0.035
b1	1.14	1.55	0.045	0.061
c	0.48	0.70	0.019	0.028
D	15.25	15.75	0.600	0.620
D1	1.27 typ.		0.050 typ.	
E	10.00	10.40	0.394	0.409
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
F	1.23	1.32	0.048	0.052
H1	6.20	6.60	0.244	0.260
J1	2.40	2.72	0.094	0.107
L	13.00	14.00	0.512	0.551
L1	3.50	3.93	0.138	0.155
L20	16.40 typ.		0.646 typ.	
L30	28.90 typ.		1.138 typ.	
θP	3.75	3.85	0.148	0.152
Q	2.65	2.95	0.104	0.116

2.4 TO-220FPAB package information

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

Figure 14. **TO-220FPAB package outline**

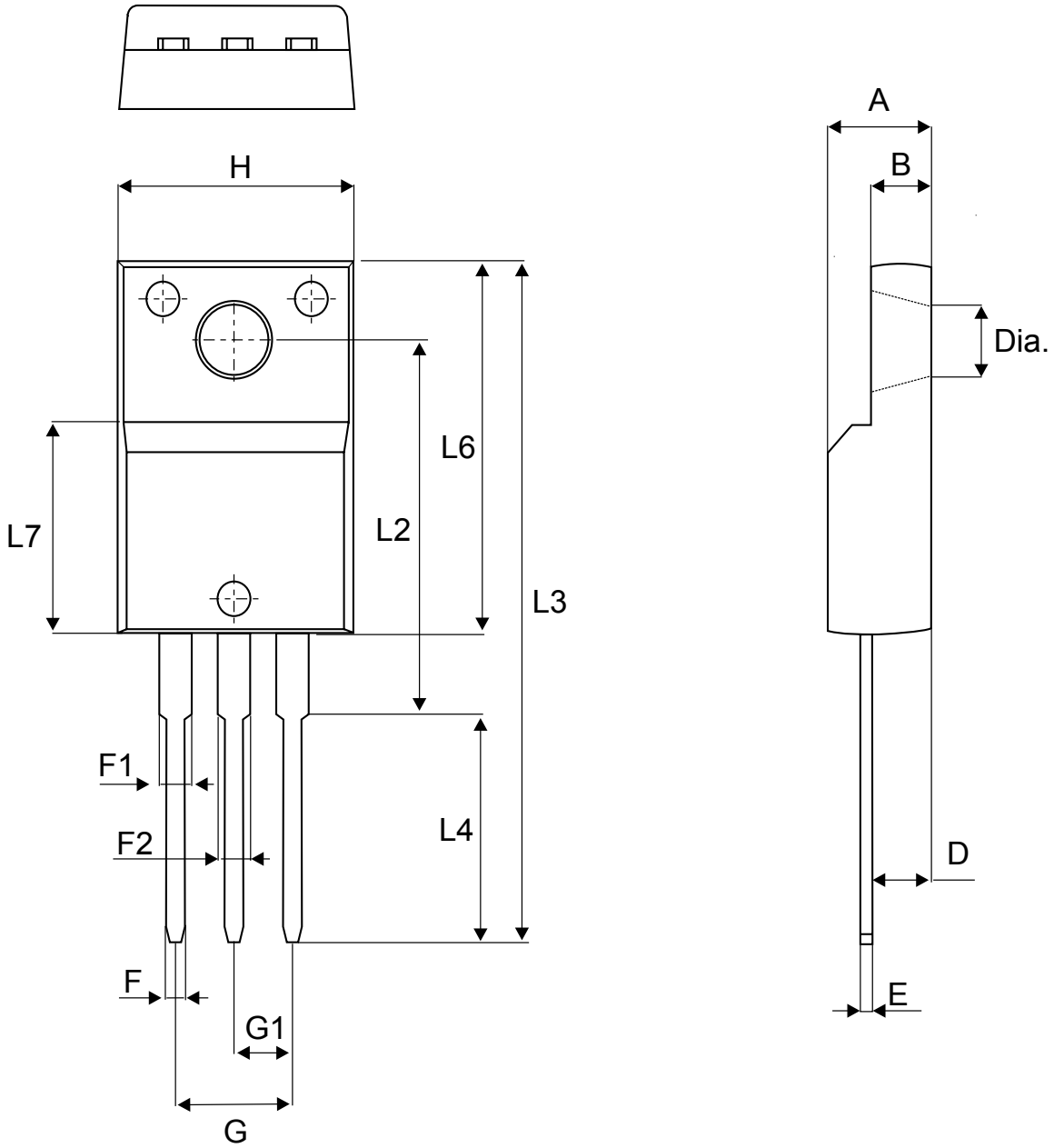


Table 7. **TO-220FPAB package mechanical data**

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	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

3 Ordering information

Table 8. **Ordering information**

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

Revision history

Table 9. **Document revision history**

Date	Revision	Changes
Jul-2003	6D	Last update
11-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, Table 1: "Device summary" and packages silhouette in cover page. Updated Section 1: "Characteristics" and Section 1.1: "Characteristics(curves)". Updated Section 2.2: "D²PAK package information".
08-Fev-2018	11	Updated I²PAK package information.
10-Apr-2018	12	Updated Table 5. I²PAK package mechanical data.