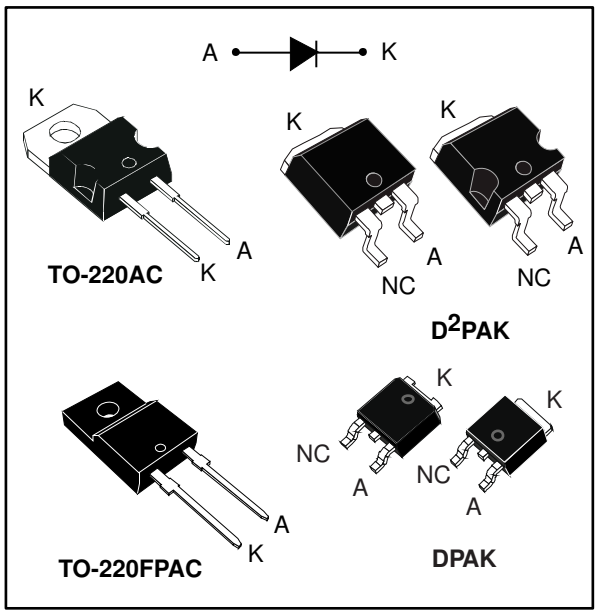
STTH802

Ultrafast recovery diode

Datasheet - production data



Description

This device uses ST's 200 V planar Pt doping technology, and is especially suited for switching mode base drive and transistor circuits.

Packaged in TO-220AC, TO-220FPAC, DPAK, and D²PAK this device is intended for use in low voltage, high frequency inverters, freewheeling and polarity protection.

Table 1: Device summary

Symbol	Value
$I_{F(AV)}$	8 A
V_{RRM}	200 V
T_j (max.)	175 °C
V_F (typ.)	0.8 V
t_{rr} (typ.)	17 ns

Features

- Very low conduction losses
- Negligible switching losses
- Low forward and reverse recovery time
- High junction temperature
- ECOPACK®2 compliant component for DPAK and D²PAK on demand
- Insulated package: TO-220FPAC
  - Insulating voltage: 2000 V_{RMS} sine

This is information on a product in full production. www.st.com

1 Characteristics

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

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			200	V
$I_{F(RMS)}$	Forward rms current			16	A
$I_{F(AV)}$	Average forward current δ = 0.5, square wave	TO-220AC, DPAK, D^2PAK	T_C = 145 °C	8	A
		TO-220FPAC	T_C = 125 °C		
I_{FSM}	Surge non repetitive forward current	tp = 10 ms sinusoidal		100	A
T_{stg}	Storage temperature range			-65 to +175	°C
T_j	Maximum operating junction temperature			175	°C

Table 3: Thermal parameter

Symbol	Parameter		Max. value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AC, DPAK, D^2PAK	3.2	°C/W
		TO-220FPAC	5.5	

Table 4: Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-		6	µA
		T_j = 125 °C		-	6	60	
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 8 A	-	0.95	1.05	V
		T_j = 150 °C		-	0.80	0.90	

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:

$P = 0.73 \times I_{F(AV)} + 0.021 \times I_{F^2(RMS)}$

Table 5: Dynamic electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	T_j = 25 °C	I_F = 1 A, dI_F/dt = -50 A/µs, V_R = 30 V	-	25	30	ns
		T_j = 25 °C	I_F = 1 A, dI_F/dt = -100 A/µs, V_R = 30 V	-	17	22	ns
I_{RM}	Reverse recovery current	T_j = 125 °C	I_F = 8 A, dI_F/dt = -200 A/µs, V_R = 160 V	-	5.5	7.0	A
t_{fr}	Forward recovery time	T_j = 25 °C	I_F = 8 A, dI_F/dt = 50 A/µs, V_{FR} = 1.1 x V_{Fmax}	-	150		ns
V_{FP}	Forward recovery voltage	T_j = 25 °C	I_F = 8 A, dI_F/dt = 50 A/µs	-	1.5		V

1.1 Characteristics (curves)

Figure 1: Peak current versus duty cycle

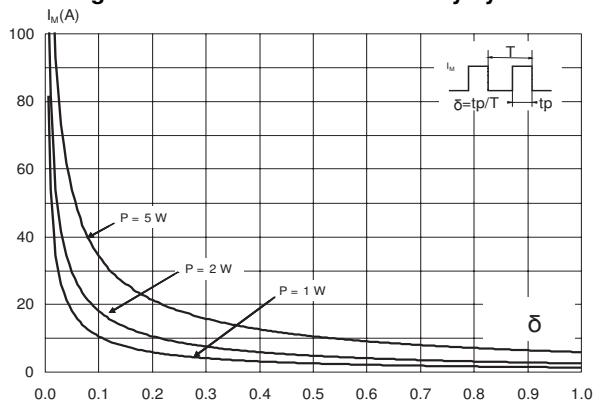


Figure 2: Forward voltage drop versus forward current (typical values)

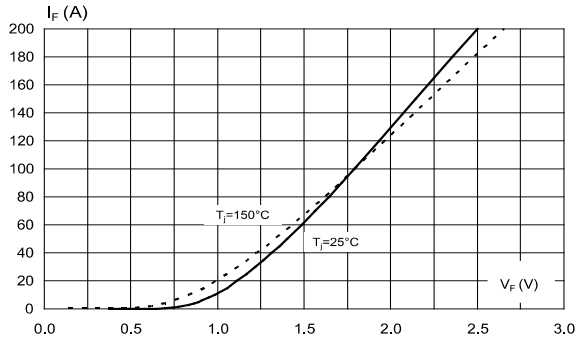


Figure 3: Forward voltage drop versus forward current (maximum values)

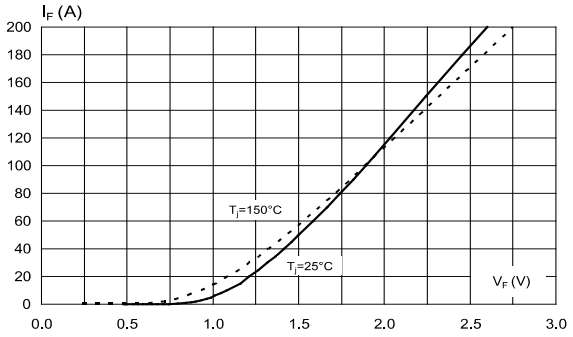


Figure 4: Relative variation of thermal impedance, junction to case, versus pulse duration

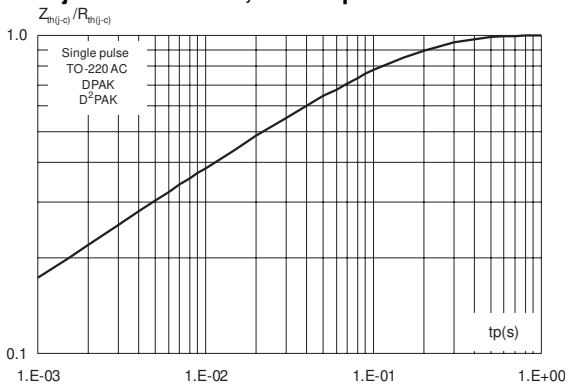


Figure 5: Relative variation of thermal impedance, junction to case, versus pulse duration

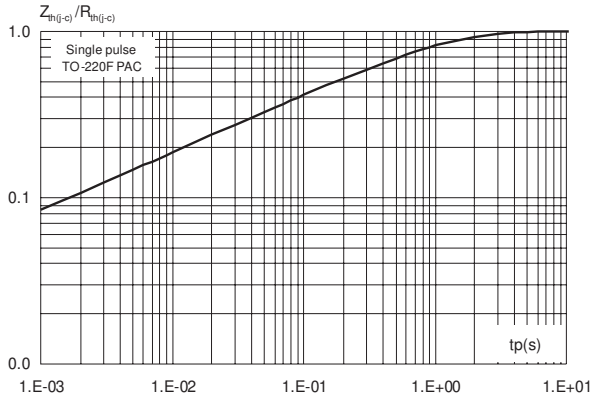


Figure 6: Junction capacitance versus reverse applied voltage (typical values)

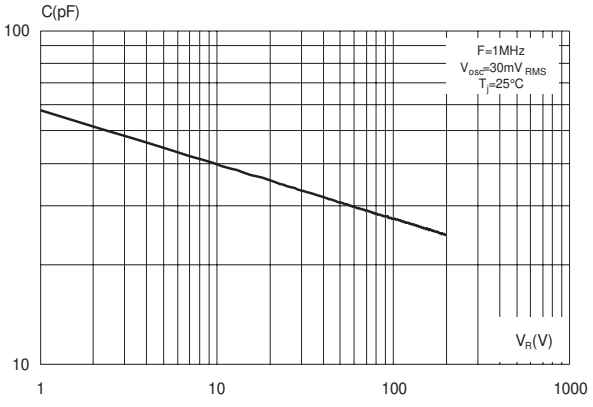


Figure 7: Reverse recovery charges versus dI_F/dt (typical values)

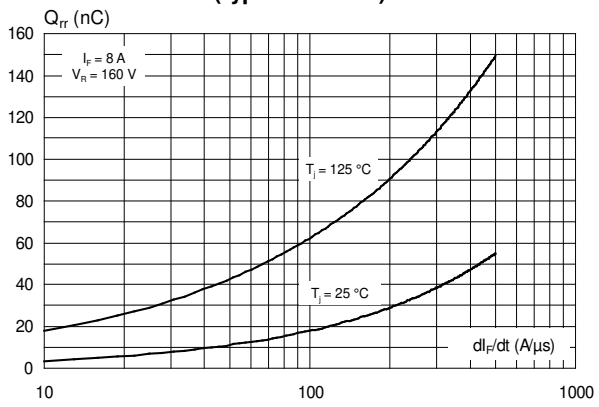


Figure 8: Reverse recovery time versus dI_F/dt (typical values)

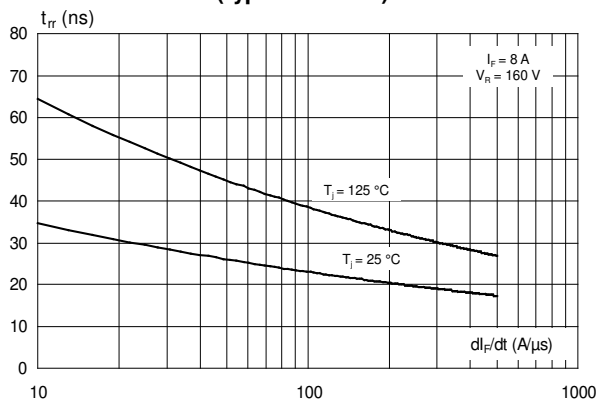


Figure 9: Peak reverse recovery current versus dI_F/dt (typical values)

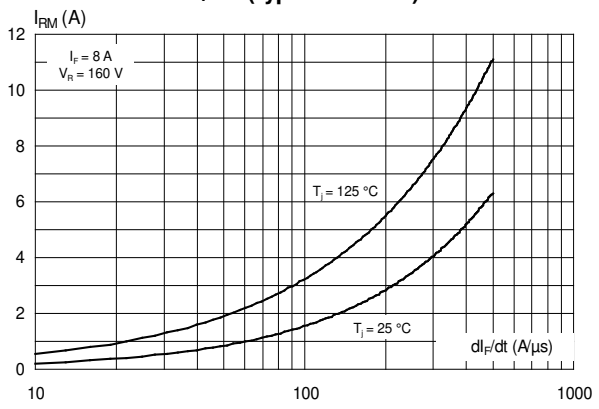


Figure 10: Relative variation of dynamic parameters versus junction temperature

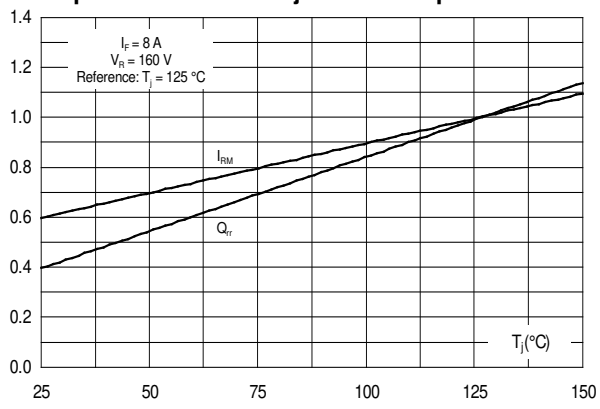


Figure 11: Thermal resistance, junction to ambient, versus copper surface under tab

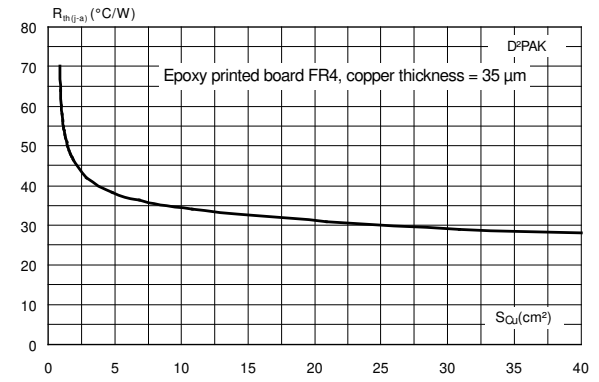
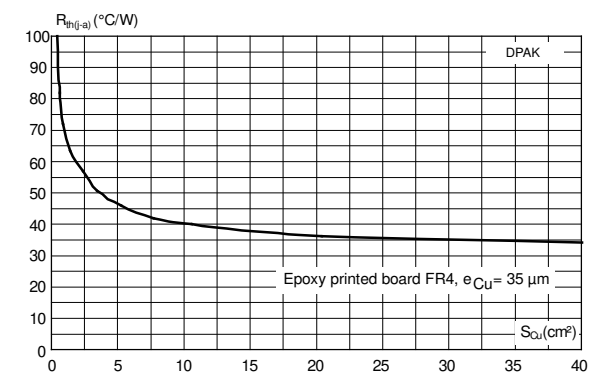


Figure 12: Thermal resistance, junction to ambient, versus copper surface under tab



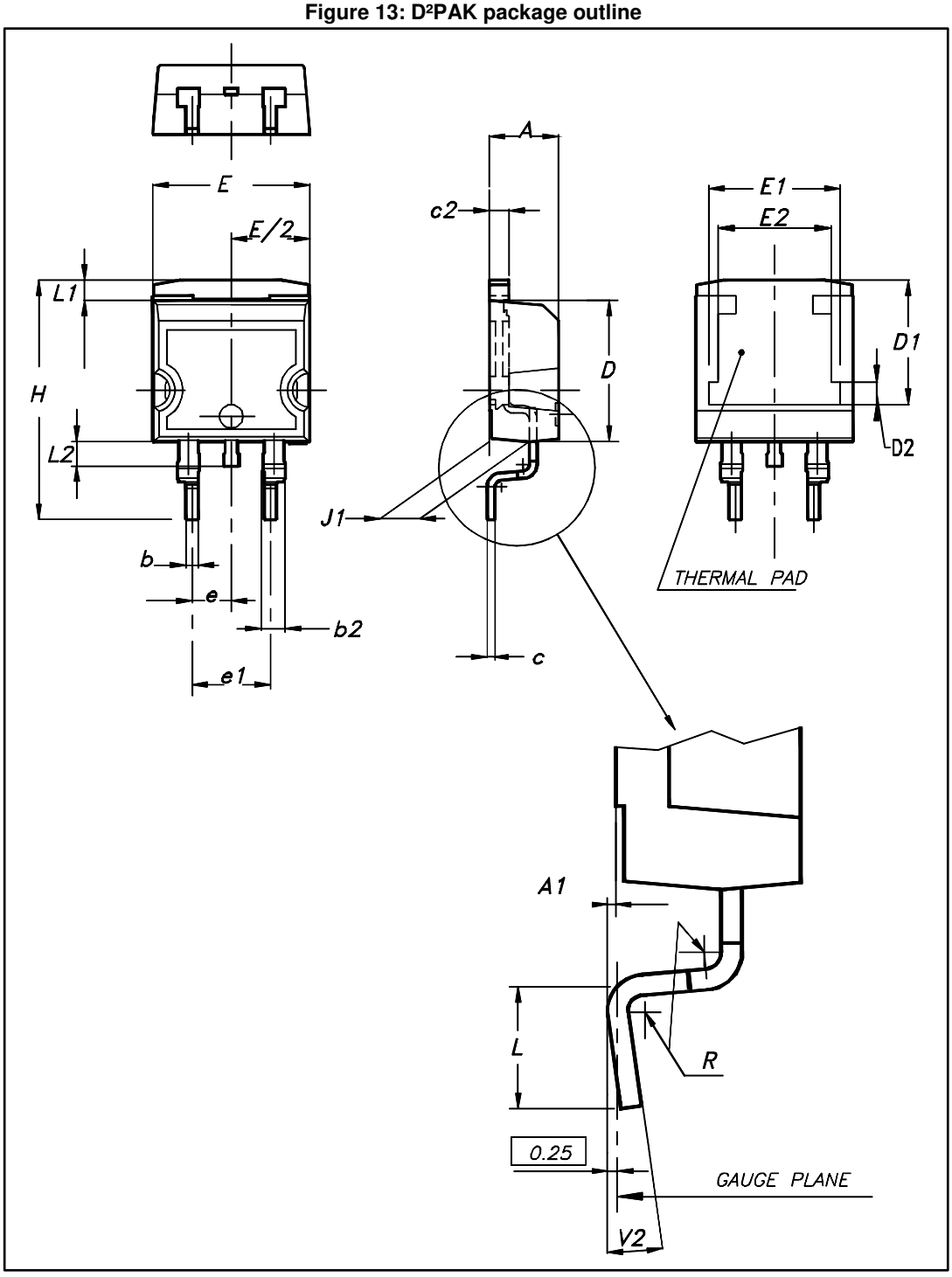
2 Package information

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
- Recommended torque value: 0.55 N·m (for TO-220AC and TO-220FPAC)
- Maximum torque value: 0.7 N·m (for TO-220AC and TO-220FPAC)

2.1 D²PAK package information

Figure 13: D²PAK package outline

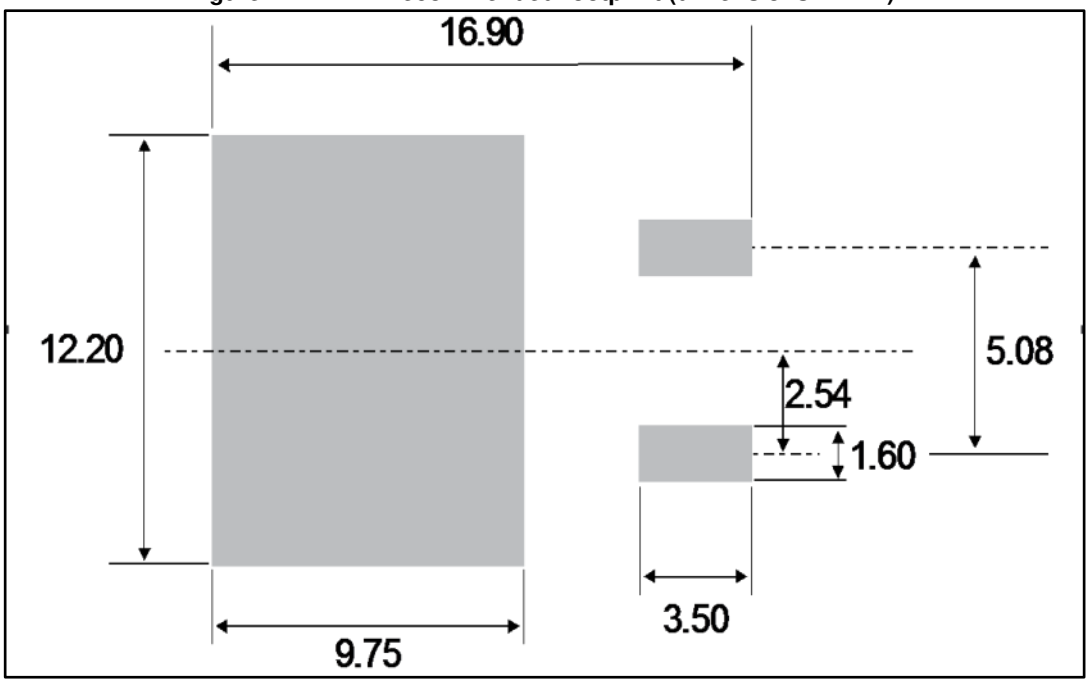


This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 6: D²PAK package mechanical data

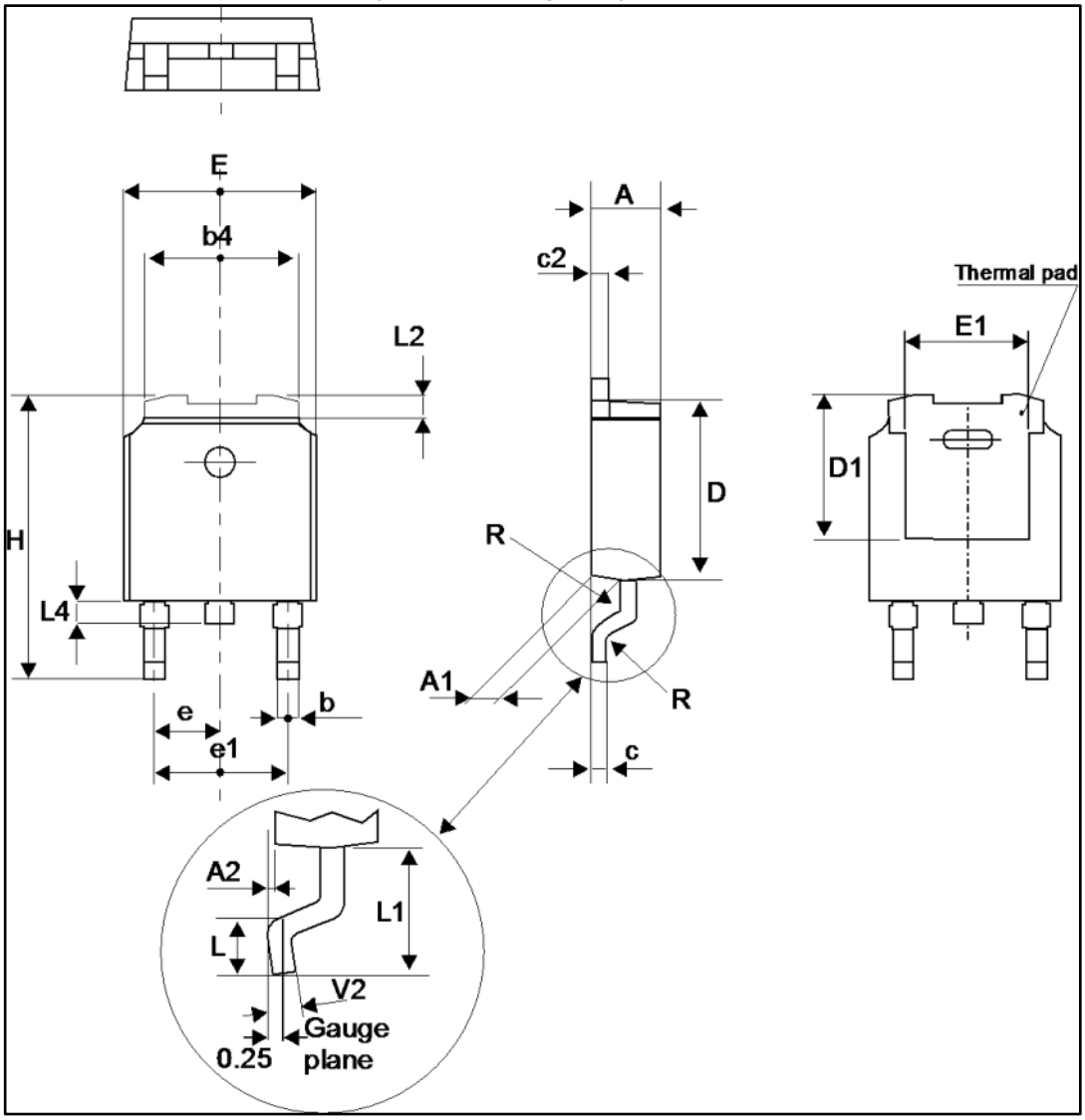
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.36	4.60	0.172	0.181
A1	0.00	0.25	0.000	0.010
b	0.70	0.93	0.028	0.037
b2	1.14	1.70	0.045	0.067
c	0.38	0.69	0.015	0.027
c2	1.19	1.36	0.047	0.053
D	8.60	9.35	0.339	0.368
D1	6.90	8.00	0.272	0.311
D2	1.10	1.50	0.043	0.060
E	10.00	10.55	0.394	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 14: D²PAK recommended footprint (dimensions in mm)



2.2 DPAK package information

Figure 15: DPAK package outline

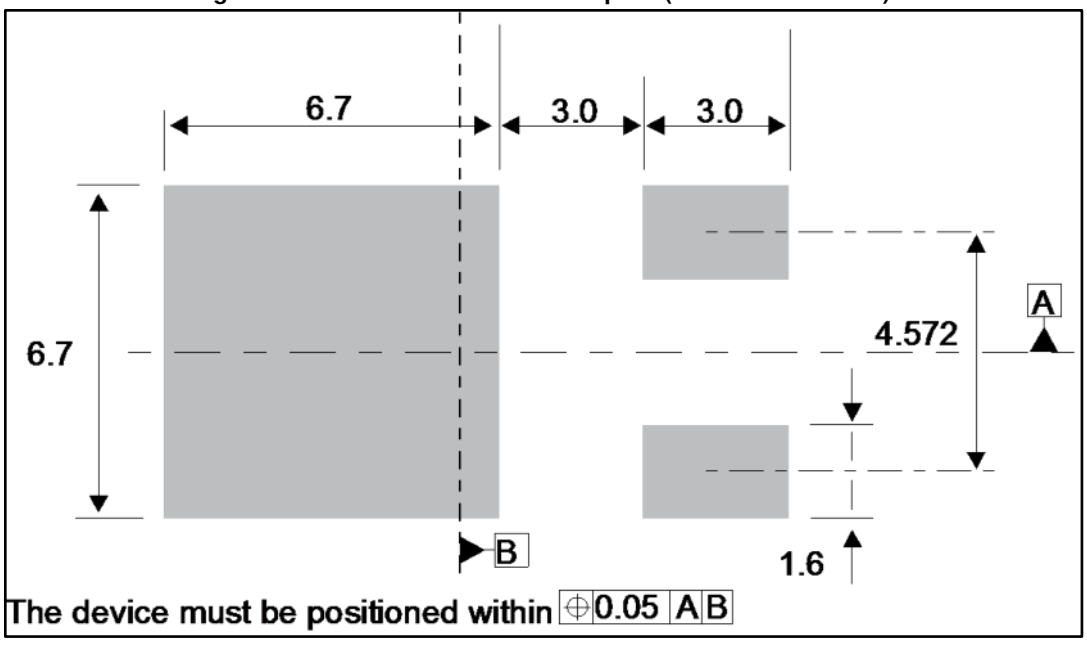


This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 7: DPAK package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	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	0.215
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	0.265
E1	4.32	5.50	0.170	0.216
e	2.286 typ.		0.090 typ.	
e1	4.40	4.70	0.173	0.185
H	9.35	10.40	0.368	0.409
L	1.0	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 16: DPAK recommended footprint (dimensions in mm)



2.3 TO-220AC package information

Figure 17: TO-220AC package outline

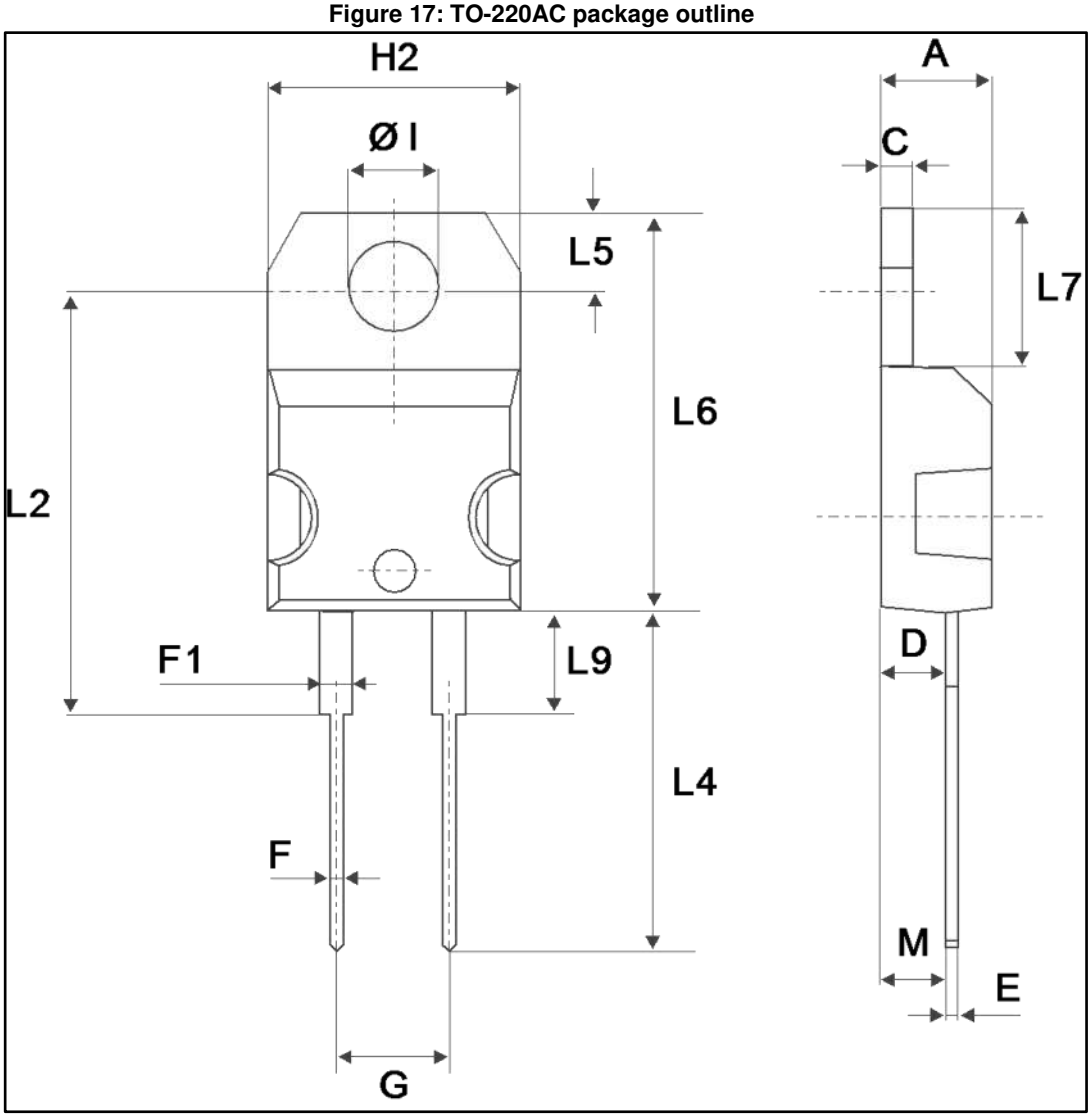


Table 8: TO-220AC package mechanical data

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
G	4.95	5.15	0.194	0.202
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.	
ØI	3.75	3.85	0.147	0.151

2.4 TO-220FPAC package information

Figure 18: TO-220FPAC package outline

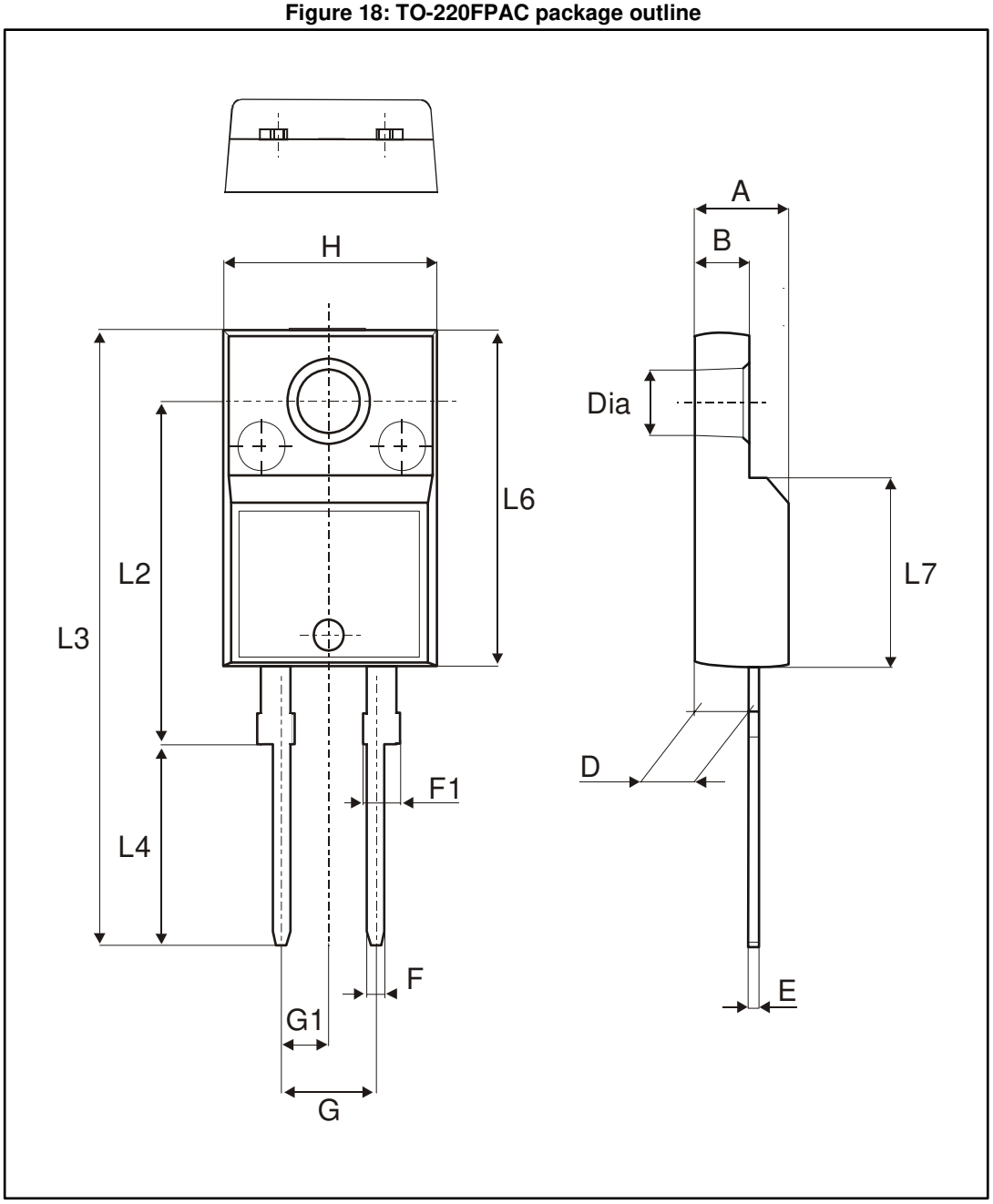


Table 9: TO-220FPAC package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
B	2.50	2.70	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	1.00	0.030	0.039
F1	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.		0.630 typ.	
L3	28.60	30.60	0.126	1.205
L4	9.80	10.60	0.386	0.417
L6	15.90	16.40	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 10: Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH802D	STTH802	TO-220AC	1.86g	50	Tube
STTH802FP	STTH802	TO-220FPAC	1.9g	50	Tube
STTH802B-TR	STTH 802	DPAK	0.32g	2500	Tape and reel
STTH802G	STTH802	D^2PAK	1.38g	50	Tube
STTH802G-TR	STTH802	D^2PAK	1.38g	1000	Tape and reel

4 Revision history

Table 11: Document revision history

Date	Revision	Changes
03-may-2006	1	First issue.
22-Sep-2006	2	Added D^2PAK package.
07-Aug-2017	3	Updated features and image in cover page. Updated *Section 1.1: "Characteristics (curves)"*. Updated *Section 2: "Package information"*. Minor text changes.

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