

Ultrafast recovery diode

Main product characteristics

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

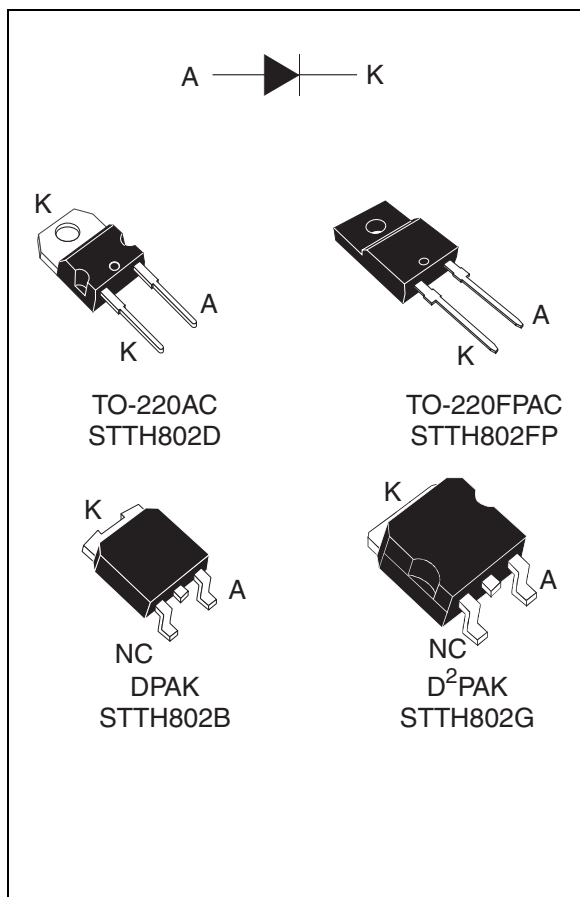
Features and benefits

- Very low conduction losses
- Negligible switching losses
- Low forward and reverse recovery time
- High junction temperature

Description

The STTH802 uses ST's new 200 V planar Pt doping technology, and is specially 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, free wheeling and polarity protection.



Order codes

Part Number	Marking
STTH802D	STTH802
STTH802FP	STTH802
STTH802B	STTH802
STTH802B-TR	STTH802
STTH802G	STTH802
STTH802G-TR	STTH802

1 Characteristics

Table 1. Absolute ratings (limiting values at $T_j = 25^\circ\text{C}$, unless otherwise specified)

Symbol	Parameter			Value	Unit
V _{RRM}	Repetitive peak reverse voltage			200	V
I _{F(RMS)}	RMS forward current			16	A
I _{F(AV)}	Average forward current, δ = 0.5	TO-220A, DPAK, D ² PAK	T _c = 145° C	8	A
		TO-220FPAC	T _c = 125° C		
I _{FSM}	Surge non repetitive forward current	t _p = 10 ms Sinusoidal		100	A
T _{stg}	Storage temperature range			-65 to + 175	° C
T _j	Maximum operating junction temperature			175	° C

Table 2. Thermal parameters

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AC, DPAK, D ² PAK	3.2	$^\circ\text{C/W}$
		TO-220FPAC	5.5	

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			6	μA
		$T_j = 125^\circ\text{C}$			6	60	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25^\circ\text{C}$	$I_F = 8\text{ A}$		0.95	1.05	V
		$T_j = 150^\circ\text{C}$			0.8	0.90	

1. Pulse test: $t_p = 5\text{ ms}$, $\delta < 2\%$

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

To evaluate the conduction losses use the following equation:

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

Table 4. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Typ	Max.	Unit
t_{rr}	Reverse recovery time	$I_F = 1\text{ A}$, $di_F/dt = -50\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$, $T_j = 25\text{ }^\circ\text{C}$		25	30	ns
		$I_F = 1\text{ A}$, $di_F/dt = -100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$, $T_j = 25\text{ }^\circ\text{C}$		17	22	
I_{RM}	Reverse recovery current	$I_F = 8\text{ A}$, $di_F/dt = -200\text{ A}/\mu\text{s}$, $V_R = 160\text{ V}$, $T_j = 125\text{ }^\circ\text{C}$		5.5	7	A
t_{fr}	Forward recovery time	$I_F = 8\text{ A}$, $di_F/dt = 50\text{ A}/\mu\text{s}$, $V_{FR} = 1.1 \times V_{Fmax}$, $T_j = 25\text{ }^\circ\text{C}$		150		ns
V_{FP}	Forward recovery voltage	$I_F = 8\text{ A}$, $di_F/dt = 50\text{ A}/\mu\text{s}$, $T_j = 25\text{ }^\circ\text{C}$		1.5		V

Figure 1. Peak current versus duty cycle

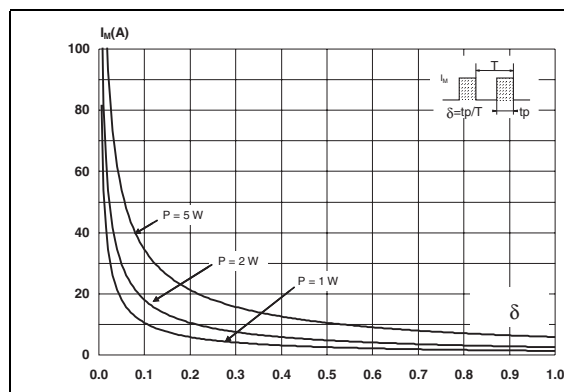


Figure 3. Forward voltage drop versus forward current (maximum values)

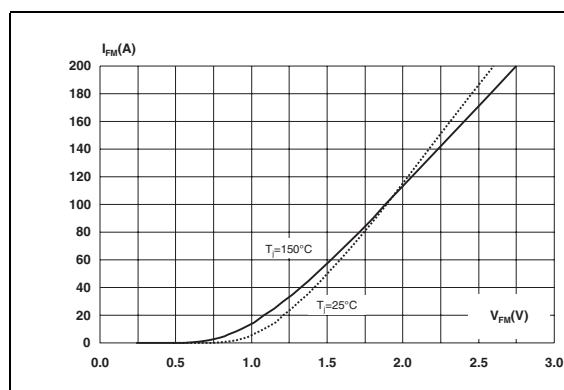


Figure 2. Forward voltage drop versus forward current (typical values)

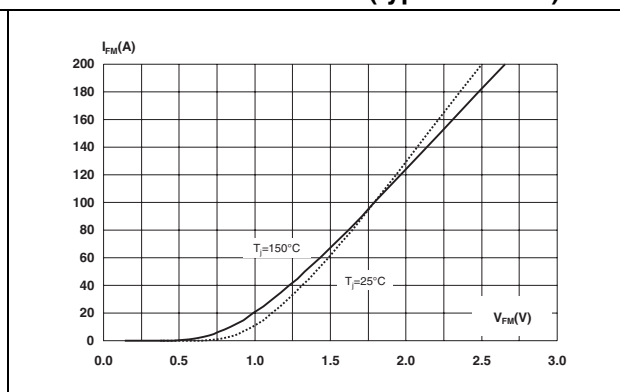


Figure 4. Relative variation of thermal impedance, junction to case, versus pulse duration (TO-220AC, DPAK, D²PAK)

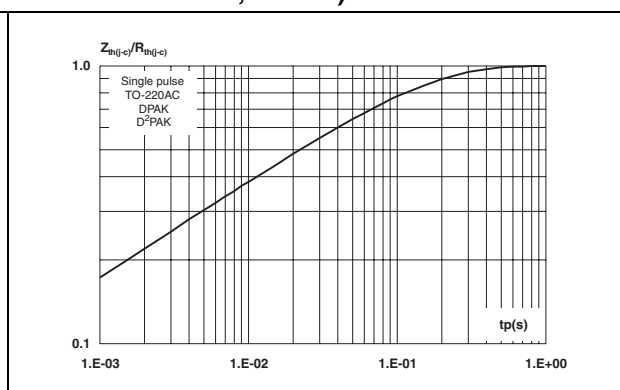


Figure 5. Relative variation of thermal impedance, junction to case, versus pulse duration (TO-220FPAC)

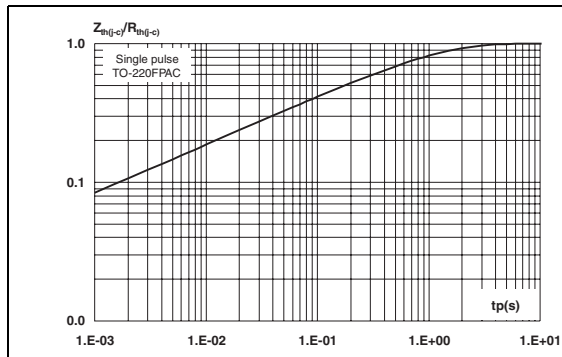


Figure 6. Junction capacitance versus reverse applied voltage (typical values)

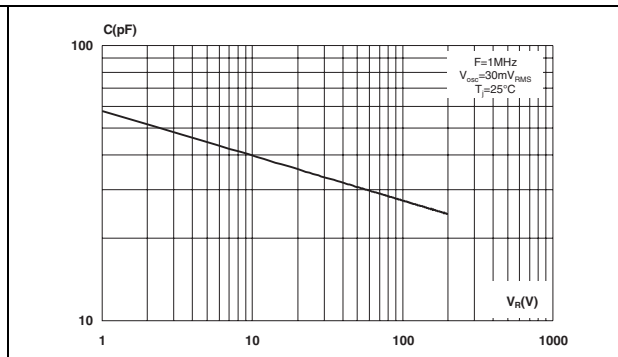


Figure 7. Reverse recovery charges versus dl_F/dt (typical values)

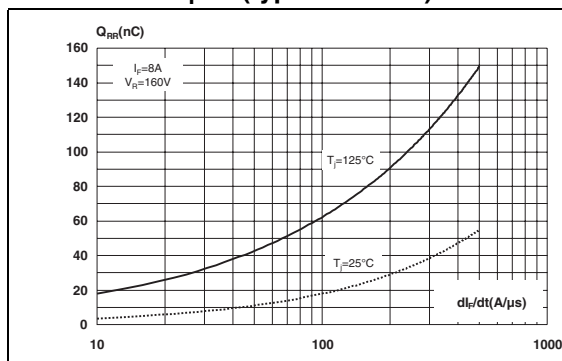


Figure 8. Reverse recovery time versus dl_F/dt (typical values)

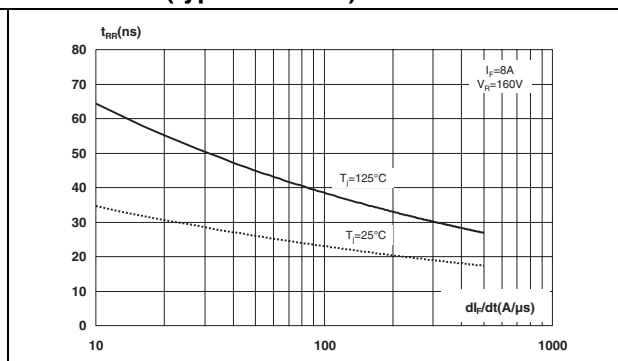


Figure 9. Peak reverse recovery current versus dl_F/dt (typical values)

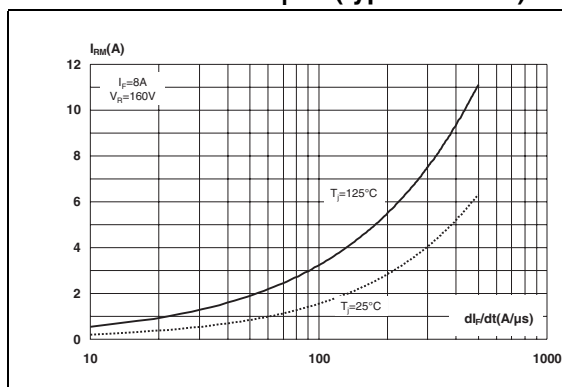


Figure 10. Dynamic parameters versus junction temperature

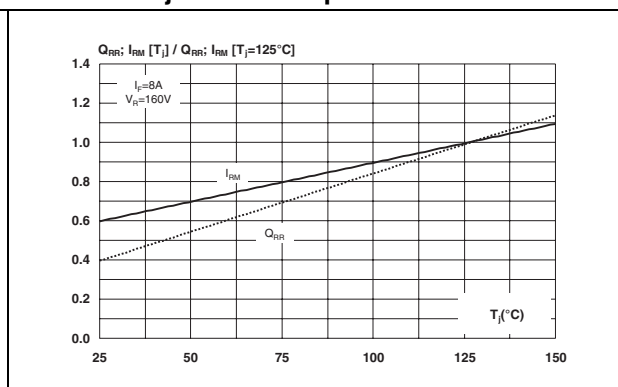


Figure 11. Thermal resistance, junction to ambient, versus copper surface under tab - Epoxy printed circuit board FR4, $e_{CU} = 35 \mu m$ (D²PAK)

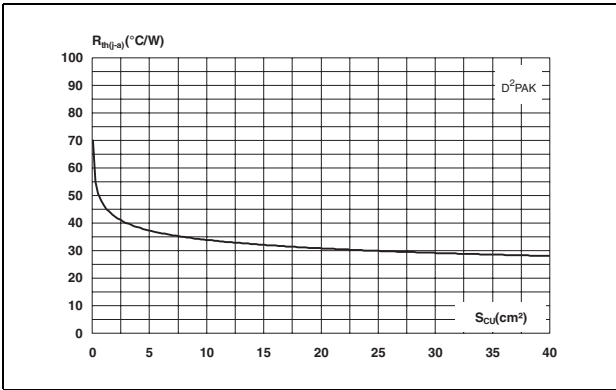
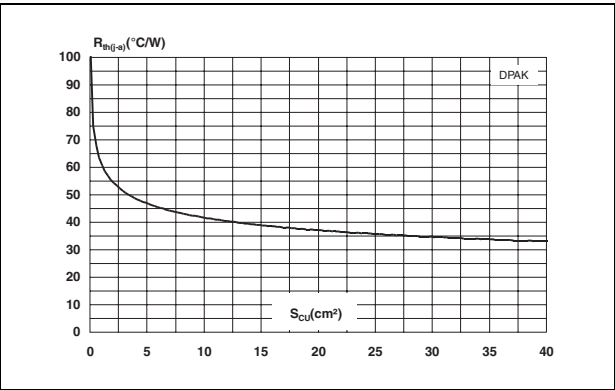
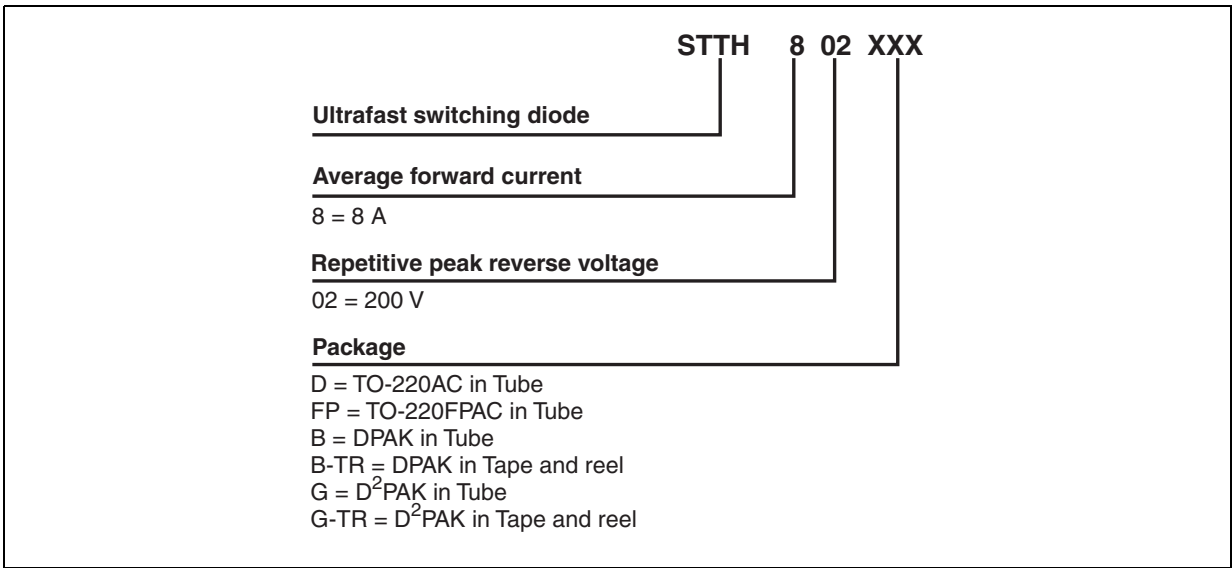


Figure 12. Thermal resistance, junction to ambient, versus copper surface under tab - Epoxy printed circuit board FR4, $e_{CU} = 35 \mu m$ (DPAK)



2 Ordering information scheme



3 Package information

Epoxy meets UL94, V0

Cooling method: by conduction (C)

Recommended torque value: 0.8 Nm

Maximum torque value: 1.0 Nm

Table 5. T0-220AC dimensions

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.	
Diam. I	3.75	3.85	0.147	0.151

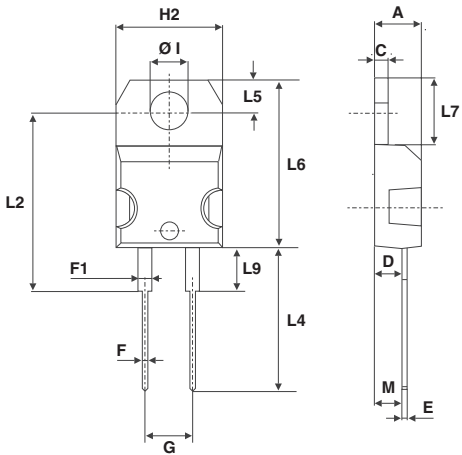
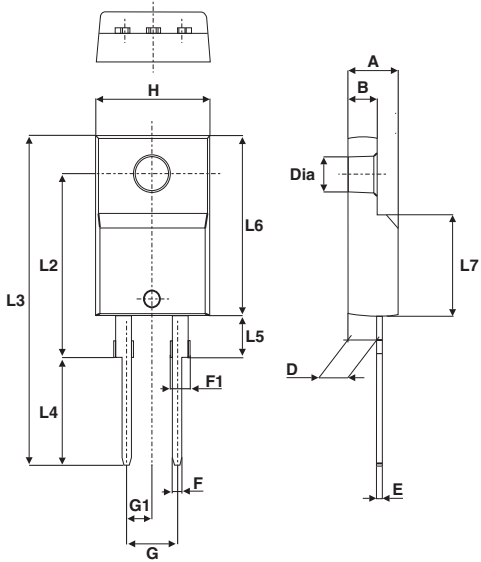


Table 6. T0-220FPAC dimensions

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
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

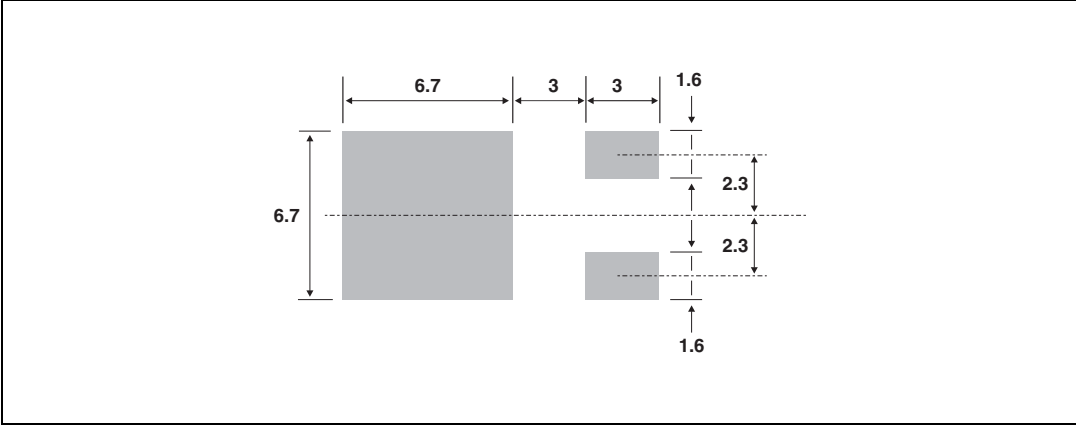


The technical drawing illustrates the T0-220FPAC package from three perspectives: top, side, and detail. The top view shows a rectangular body with a central circular feature and a smaller circular feature below it. Dimensions L2, L3, L4, L5, L6, and L7 are indicated for the vertical stack of components. The side view shows the profile of the package with dimensions A, B, D, and E. The detail view shows a close-up of the bottom of the package with dimensions F, F1, G, and G1. The dimension Dia. is indicated for the central circular feature.

Table 7. DPAK dimensions

REF	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max	Min.	Max.
A	2.20	2.40	0.086	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
B2	5.20	5.40	0.204	0.212
C	0.45	0.60	0.017	0.023
C2	0.48	0.60	0.018	0.023
D	6.00	6.20	0.236	0.244
E	6.40	6.60	0.251	0.259
G	4.40	4.60	0.173	0.181
H	9.35	10.10	0.368	0.397
L2	0.80 typ.		0.031 typ.	
L4	0.60	1.00	0.023	0.039
V2	0°	8°	0°	8°

Figure 13. DPAK footprint (dimensions in mm)



Technical drawing of a Tee fitting showing dimensions and a table of values.

Dimensions:

- A: Overall width of the Tee.
- A1: Distance from the centerline of the Tee to the center of the branch connection.
- A2: Distance from the centerline of the Tee to the center of the branch connection (alternative view).
- B: Distance from the centerline of the Tee to the center of the branch connection.
- B2: Distance from the centerline of the Tee to the center of the branch connection (alternative view).
- C: Distance from the centerline of the Tee to the center of the branch connection.
- C2: Distance from the centerline of the Tee to the center of the branch connection (alternative view).
- D: Overall height of the Tee.
- E: Overall width of the Tee (alternative view).
- G: Distance from the centerline of the Tee to the center of the branch connection.
- L: Overall length of the Tee.
- L2: Distance from the centerline of the Tee to the center of the branch connection.
- L3: Distance from the centerline of the Tee to the center of the branch connection (alternative view).
- M: Distance from the centerline of the Tee to the center of the branch connection.
- R: Radius of the branch connection.
- V2: Angle of the branch connection.

Table of Values:

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.49	2.69	0.098	0.106
A2	0.03	0.23	0.001	0.009
B	0.70	0.93	0.027	0.037
B2	1.14	1.70	0.045	0.067
C	0.45	0.60	0.017	0.024
C2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
E	10.00	10.40	0.393	0.409
G	4.88	5.28	0.192	0.208
L	15.00	15.85	0.590	0.624
L2	1.27	1.40	0.050	0.055
L3	1.40	1.75	0.055	0.069
M	2.40	3.20	0.094	0.126
R	0.40 typ.		0.016 typ.	
V2	0°	8°	0°	8°

* FLAT ZONE NO LESS THAN 2mm

Technical drawing showing a stepped profile with dimensions:

- Overall width: 16.90
- Overall height: 10.30
- Width of the base step: 8.90
- Width of the top step: 3.70
- Height of the top step: 1.30
- Height of the middle section: 5.08

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

4 Ordering information

Part Number	Marking	Package	Weight	Base qty	Delivery mode
STTH802D	STTH802	TO-220AC	1.86 g	50	Tube
STTH802FP	STTH802	TO-220FPAC	2.2 g	50	Tube
STTH802B	STTH802	DPAK	0.3 g	75	Tube
STTH802B-TR	STTH802	DPAK	0.3 g	2500	Tape and reel
STTH802G	STTH802	D ² PAK	1.48 g	50	Tube
STTH802G-TR	STTH802	D ² PAK	1.48 g	1000	Tape and reel

5 Revision history

Date	Revision	Description of Changes
03-May-2006	1	First issue
22-Sep-2006	2	Added D ² PAK package

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