

## HIGH EFFICIENCY ULTRAFAST DIODE

### MAIN PRODUCT CHARACTERISTICS

$I_{F(AV)}$	Up to 2 x 15A
$V_{RRM}$	200 V
$T_j$ (max)	175 °C
$V_F$ (typ)	0.78 V
$t_{rr}$ (typ)	22 ns

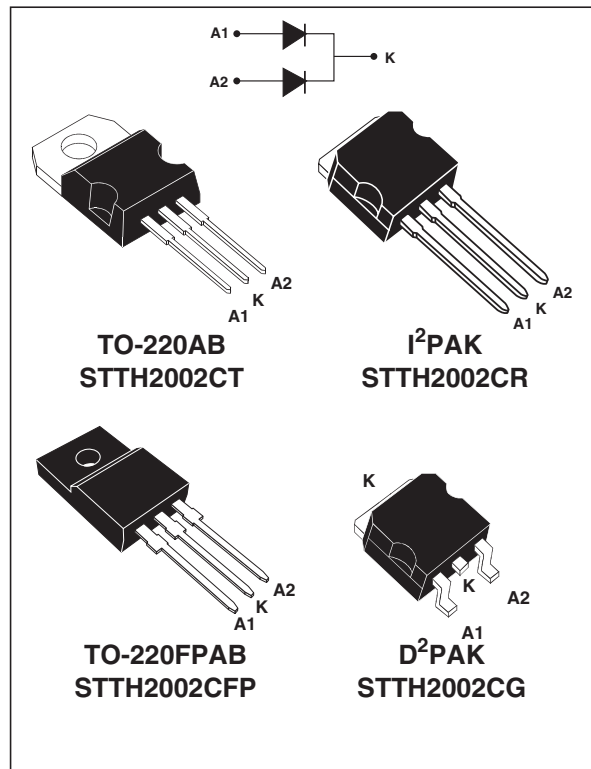
### FEATURES AND BENEFITS

- Suited for SMPS
- Low losses
- Low forward and reverse recovery times
- Low leakage current
- High junction temperature
- Insulated package: TO-220FPAB

### DESCRIPTION

Dual center tap rectifier suited for Switch Mode Power Supplies and High frequency DC to DC converters.

Packaged in TO-220AB, D<sup>2</sup>PAK, TO-220FPAB and I<sup>2</sup>PAK, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



### ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit			
$V_{RRM}$	Repetitive peak reverse voltage		200	V			
$I_{F(RMS)}$	RMS forward current		30	A			
$I_{F(AV)}$	Average forward current $\delta = 0.5$	TO-220AB / I <sup>2</sup> PAK / D <sup>2</sup> PAK	Tc = 150°C	Per diode	10	A	
			Tc = 140°C	Per device	20		
			Tc = 130°C	Per diode	15		
			Tc = 115°C	Per device	30		
		TO-220FPAB		Tc = 120°C	Per diode		10
				Tc = 95°C	Per device		20
$I_{FSM}$	Surge non repetitive forward current		tp = 10 ms Sinusoidal	90	A		
$T_{stg}$	Storage temperature range		- 65 + 175		°C		
$T_j$	Maximum operating junction temperature		175		°C		

## STTH2002C

### THERMAL PARAMETERS

Symbol	Parameter		Maximum	Unit	
$R_{th(j-c)}$	Junction to case	TO-220AB / I <sup>2</sup> PAK / D <sup>2</sup> PAK	Per diode	2.5	°C/W
			Per device	1.6	
		TO-220FPAB	Per diode	5	
			Per device	3.8	
$R_{th(j-c)}$	Coupling	TO-220AB / I <sup>2</sup> PAK / D <sup>2</sup> PAK	0.7	°C/W	
		TO-220FPAB	2.5		

When the diodes 1 and 2 are used simultaneously:

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

### STATIC ELECTRICAL CHARACTERISTICS (per diode)

Symbol	Parameter	Tests conditions		Min.	Typ.	Max.	Unit
$I_R^*$	Reverse leakage current	Tj = 25°C	$V_R = V_{RRM}$			10	μA
		Tj = 125°C			6	100	
$V_F^{**}$	Forward voltage drop	Tj = 25°C	$I_F = 10 \text{ A}$			1.1	V
		Tj = 25°C	$I_F = 20 \text{ A}$			1.25	
		Tj = 150°C	$I_F = 10 \text{ A}$		0.78	0.89	
		Tj = 150°C	$I_F = 20 \text{ A}$			1.05	

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

\*\*  $t_p = 380\mu\text{s}$ ,  $\delta < 2\%$

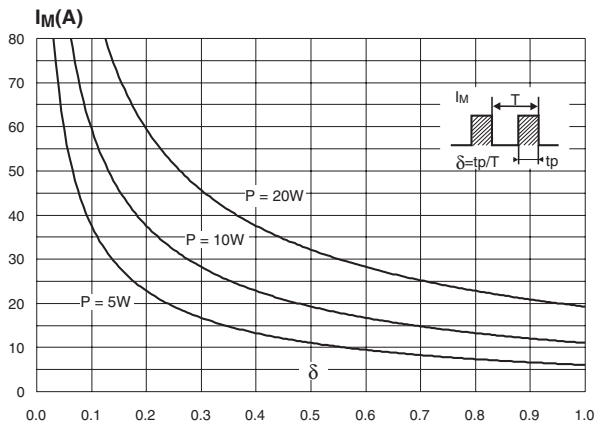
To evaluate the maximum conduction losses use the following equation :

$$P = 0.73 \times I_{F(AV)} + 0.016 I_{F(RMS)}^2$$

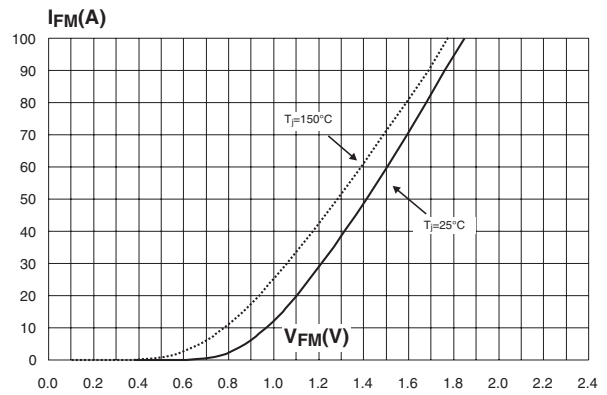
### DYNAMIC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Tests conditions		Min.	Typ.	Max.	Unit
$t_{rr}$	Reverse recovery time	Tj = 25°C	$I_F = 1 \text{ A}$ $V_R = 30\text{V}$ $di_F/dt = 100 \text{ A}/\mu\text{s}$		22	27	ns
$I_{RM}$	Reverse recovery current	Tj = 125°C	$I_F = 10 \text{ A}$ $V_R = 160\text{V}$ $di_F/dt = 200 \text{ A}/\mu\text{s}$		7.0	9.0	A
$t_{fr}$	Forward recovery time	Tj = 25°C	$I_F = 10 \text{ A}$ $di_F/dt = 100 \text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$			200	ns
$V_{FP}$	Forward recovery voltage	Tj = 25°C	$I_F = 10 \text{ A}$ $di_F/dt = 100 \text{ A}/\mu\text{s}$		2.4		V

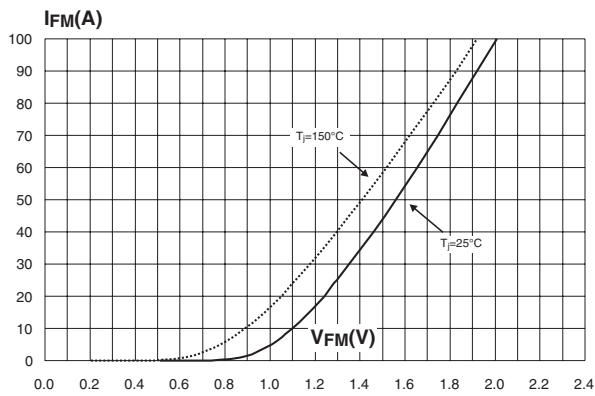
**Fig. 1:** Peak current versus duty cycle (per diode).



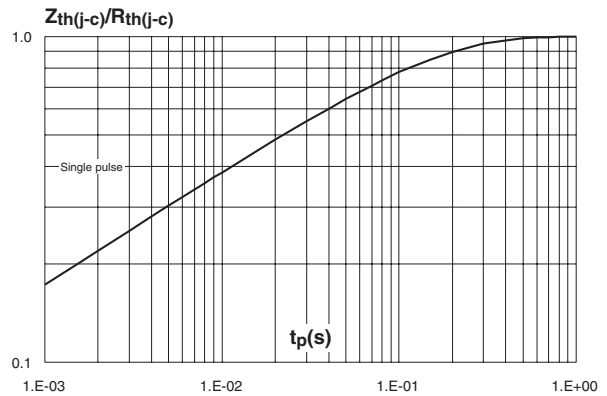
**Fig. 2-1:** Forward voltage drop versus forward current (typical values, per diode).



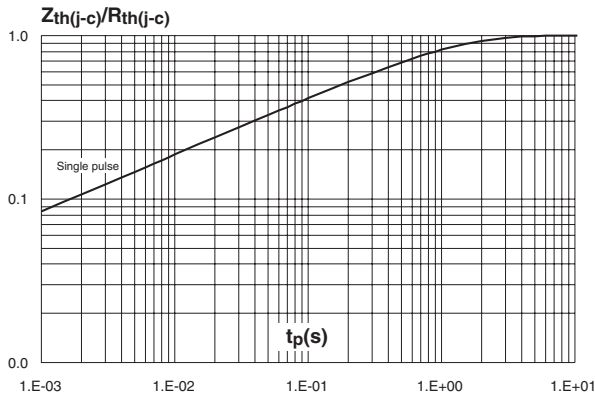
**Fig. 2-2:** Forward voltage drop versus forward current (maximum values, per diode).



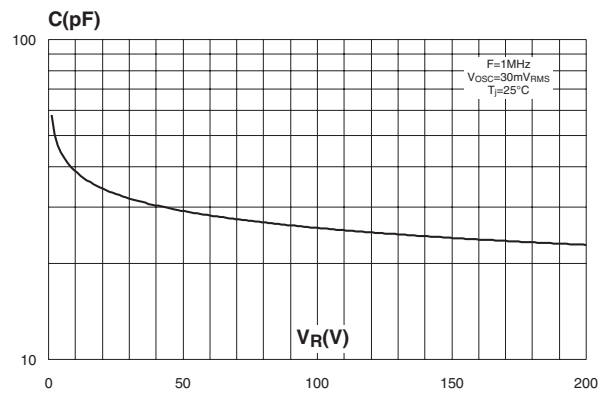
**Fig. 3-1:** Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB, I<sup>2</sup>PAK, D<sup>2</sup>PAK).



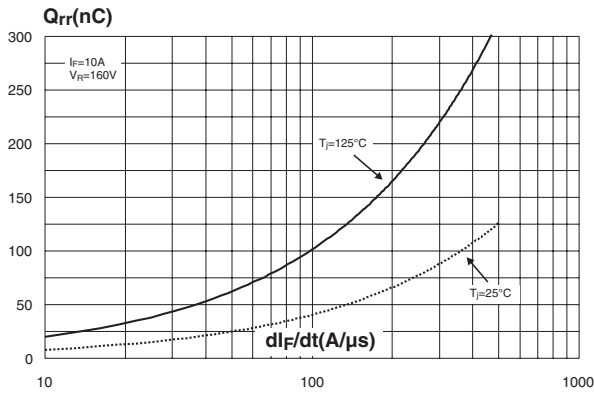
**Fig. 3-2:** Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB).



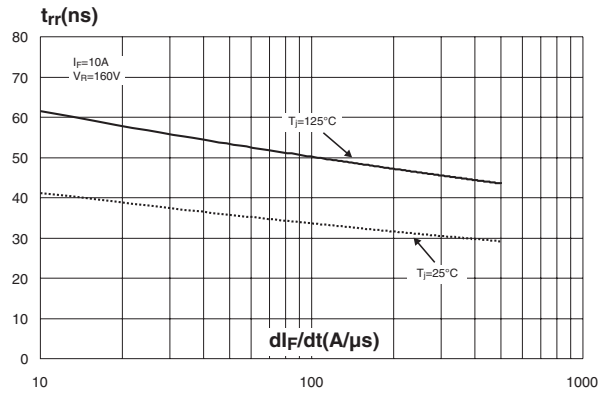
**Fig. 4:** Junction capacitance versus reverse voltage applied (typical values, per diode).



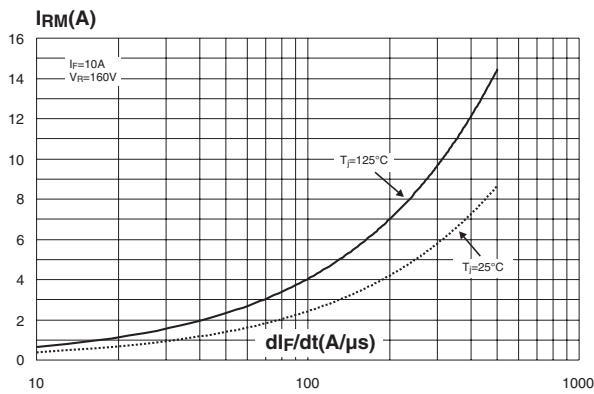
**Fig. 5:** Reverse recovery charges versus  $di_F/dt$  (typical values, per diode).



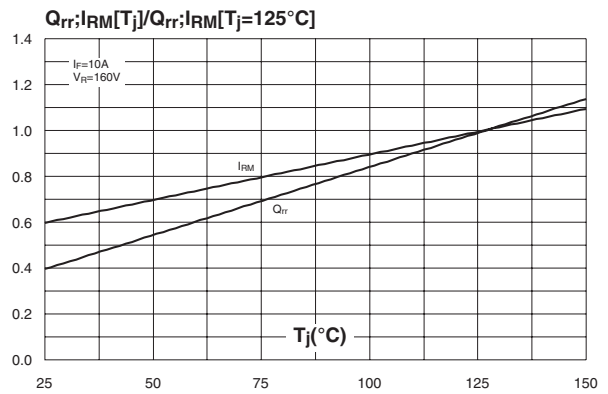
**Fig. 6:** Reverse recovery time versus  $di_F/dt$  (typical values, per diode).



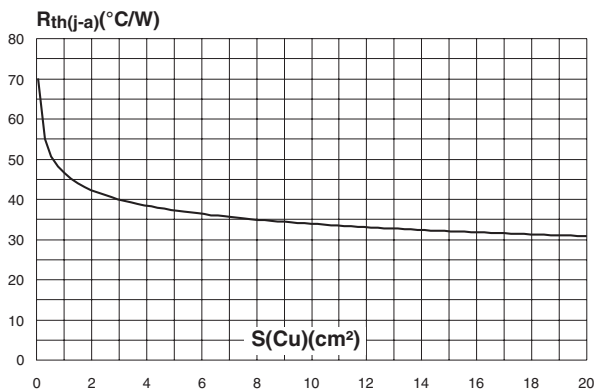
**Fig. 7:** Peak reverse recovery current versus  $di_F/dt$  (typical values, per diode).



**Fig. 8:** Dynamic parameters versus junction temperature.



**Fig. 9:** Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board FR4,  $\epsilon_{cu}$ : 35 $\mu$ m) for D<sup>2</sup>PAK.



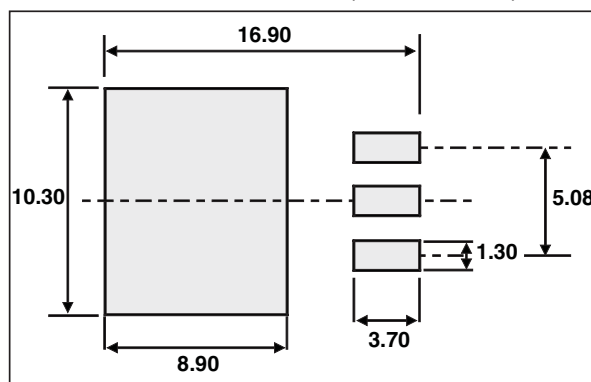
Ordering code	Marking	Package	Weight	Base qty	Delivery mode
STTH2002CT	STTH2002CT	TO-220AB	2.23 g	50	Tube
STTH2002CG	STTH2002CG	D <sup>2</sup> PAK	1.48 g	50	Tube
STTH2002CG-TR	STTH2002CG	D <sup>2</sup> PAK	1.48 g	1000	Tape & reel
STTH2002CR	STTH2002CR	I <sup>2</sup> PAK	1.49 g	50	Tube
STTH2002CFP	STTH2002CFP	TO-220FPAB	1.70g	50	Tube

**PACKAGE MECHANICAL DATA**  
D<sup>2</sup>PAK

\* FLAT ZONE NO LESS THAN 2mm

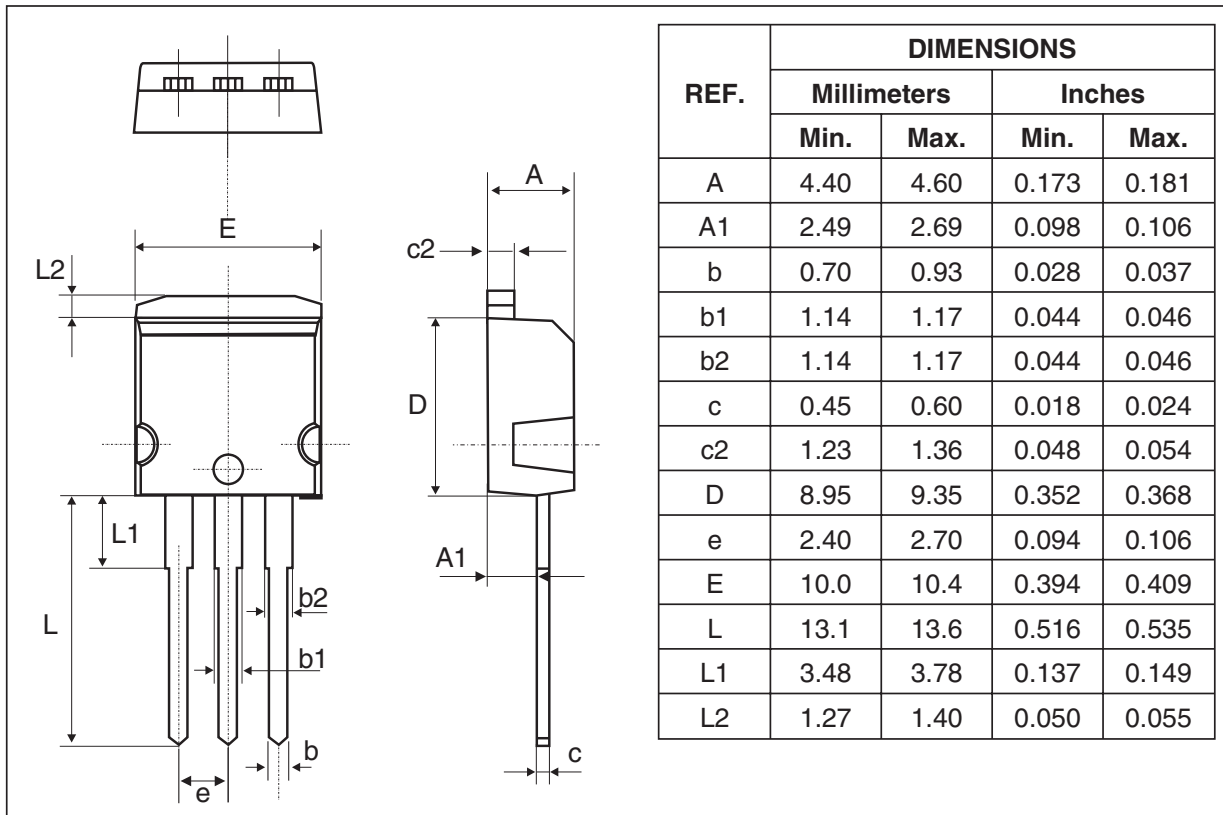
REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.49	2.69	0.098	0.106
A2	0.03	0.23	0.001	0.009
B	0.70	0.93	0.027	0.037
B2	1.14	1.70	0.045	0.067
C	0.45	0.60	0.017	0.024
C2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
E	10.00	10.40	0.393	0.409
G	4.88	5.28	0.192	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°

**FOOTPRINT DIMENSIONS** (in millimeters)

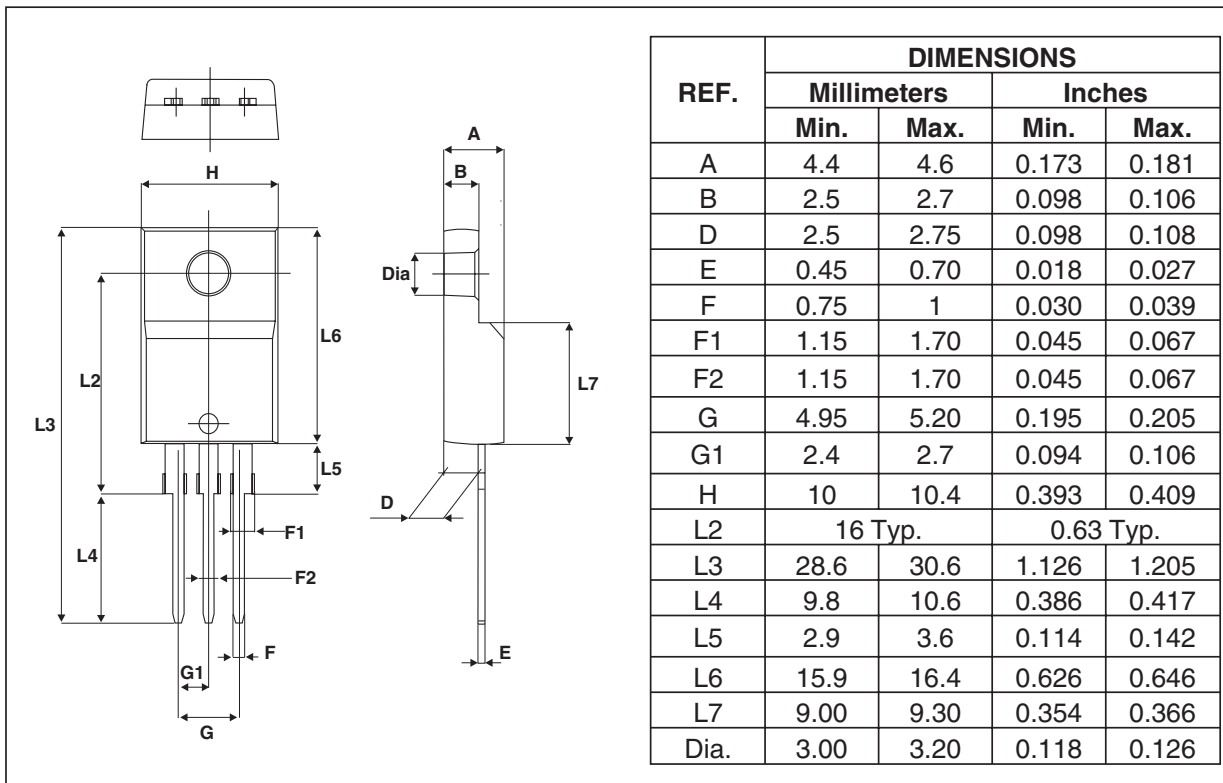


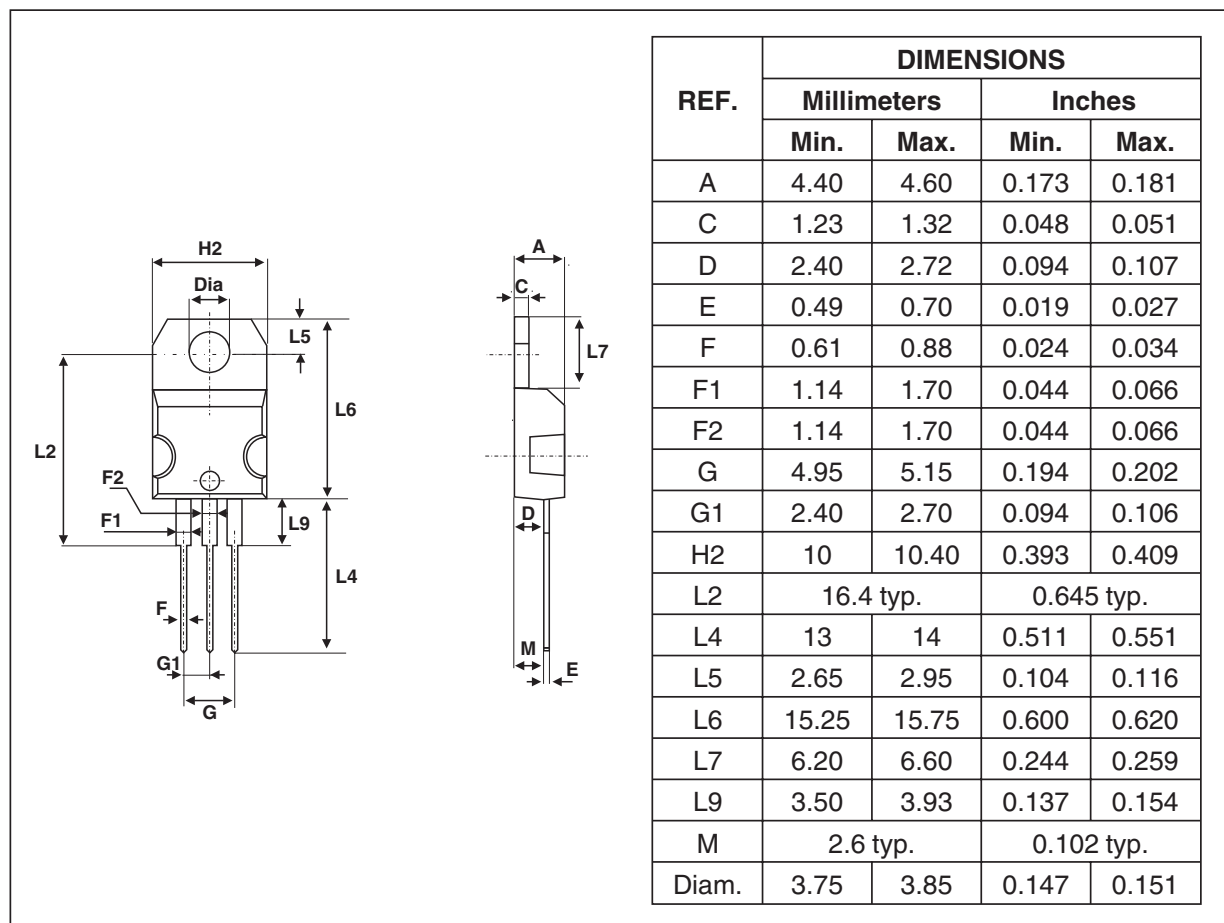
**STTH2002C**

**PACKAGE MECHANICAL DATA**  
I<sup>2</sup>PAK



**PACKAGE MECHANICAL DATA**  
TO-220FPAB



**PACKAGE MECHANICAL DATA**  
**TO-220AB**


- Epoxy meets UL94,V0
- Cooling method: by conduction (method C)
- Recommended torque value (TO-220AB): 0.8 N.m.
- Maximum torque value (TO-220AB): 1.0 N.m.
- Recommended torque value (TO-220FPAB): 0.55 N.m.
- Maximum torque value (TO-220FPAB): 0.7 N.m.

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