

## HIGH EFFICIENCY ULTRAFAST DIODE

### MAIN PRODUCT CHARACTERISTICS

$I_{F(AV)}$	Up to 2 x 10A
$V_{RRM}$	200 V
$T_j$ (max)	175 °C
$V_F$ (typ)	0.78 V
$t_{rr}$ (typ)	21 ns

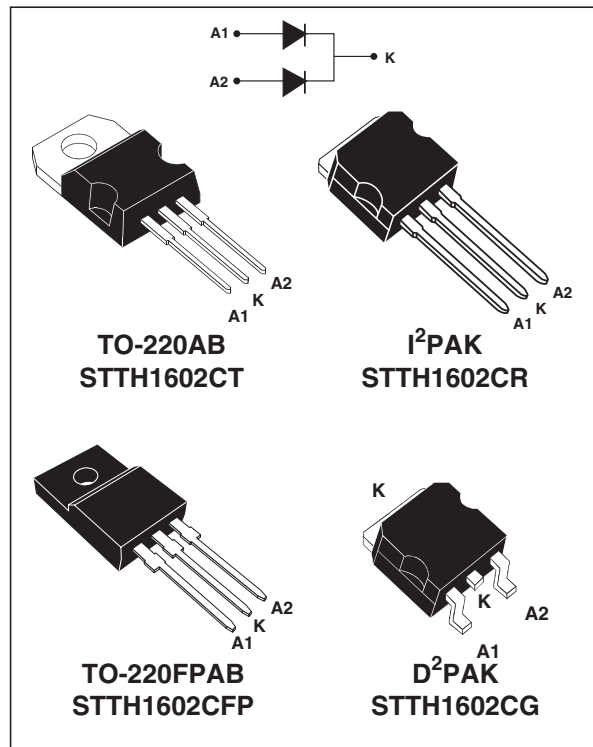
### FEATURES AND BENEFITS

- 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, per diode)

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	T <sub>c</sub> = 150°C Per diode	8	A
			T <sub>c</sub> = 140°C Per device	16	
			T <sub>c</sub> = 140°C Per diode	10	
			T <sub>c</sub> = 130°C Per device	20	
		TO-220FPAB	T <sub>c</sub> = 130°C Per diode	8	
			T <sub>c</sub> = 100°C Per device	16	
			T <sub>c</sub> = 110°C Per diode	10	
			T <sub>c</sub> = 75°C Per device	20	
$I_{FSM}$	Surge non repetitive forward current	tp = 10 ms Sinusoidal	80	A	
$T_{stg}$	Storage temperature range		- 65 + 175	°C	
$T_j$	Maximum operating junction temperature		175	°C	

## STTH1602C

### THERMAL PARAMETERS

Symbol	Parameter		Maximum	Unit	
R <sub>th(j-c)</sub>	Junction to case	TO-220AB / I <sup>2</sup> PAK / D <sup>2</sup> PAK	Per diode	3.0	°C/W
			Per device	1.9	
		TO-220FPAB	Per diode	5.5	
			Per device	4.5	
R <sub>th(j-c)</sub>	Coupling	TO-220AB / I <sup>2</sup> PAK / D <sup>2</sup> PAK	0.8	°C/W	
		TO-220FPAB	3.5		

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 <sub>R</sub> *	Reverse leakage current	T <sub>j</sub> = 25°C	V <sub>R</sub> = V <sub>RRM</sub>			6	μA
		T <sub>j</sub> = 125°C			4	60	
V <sub>F</sub> **	Forward voltage drop	T <sub>j</sub> = 25°C	I <sub>F</sub> = 8 A			1.1	V
		T <sub>j</sub> = 25°C	I <sub>F</sub> = 16 A			1.25	
		T <sub>j</sub> = 150°C	I <sub>F</sub> = 8 A		0.78	0.89	
		T <sub>j</sub> = 150°C	I <sub>F</sub> = 16 A			1.05	

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

\*\* t<sub>p</sub> = 380μs, δ < 2%

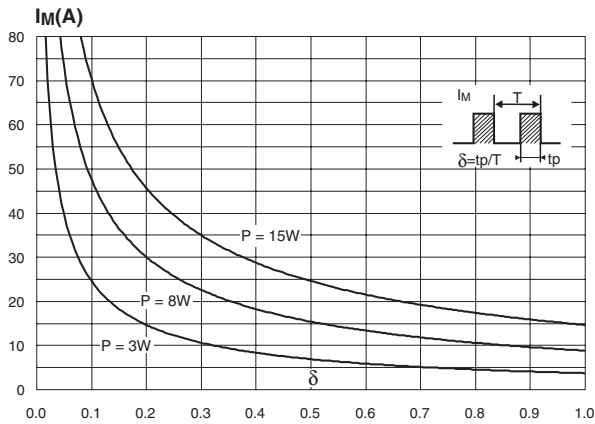
To evaluate the maximum conduction losses use the following equation :

$$P = 0.73 \times I_{F(AV)} + 0.020 I_{F(RMS)}^2$$

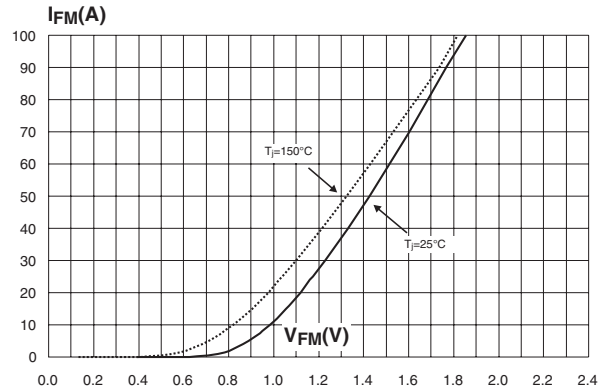
### DYNAMIC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Tests conditions		Min.	Typ.	Max.	Unit
t <sub>rr</sub>	Reverse recovery time	T <sub>j</sub> = 25°C	I <sub>F</sub> = 1 A V <sub>R</sub> = 30V dI <sub>F</sub> /dt = 100 A/μs		21	26	ns
I <sub>RM</sub>	Reverse recovery current	T <sub>j</sub> = 125°C	I <sub>F</sub> = 8 A V <sub>R</sub> = 160V dI <sub>F</sub> /dt = 200 A/μs		6.8	8.8	A
t <sub>fr</sub>	Forward recovery time	T <sub>j</sub> = 25°C	I <sub>F</sub> = 8 A dI <sub>F</sub> /dt = 100 A/μs V <sub>FR</sub> = 1.1 × V <sub>Fmax</sub>			160	ns
V <sub>FP</sub>	Forward recovery voltage	T <sub>j</sub> = 25°C	I <sub>F</sub> = 8 A dI <sub>F</sub> /dt = 100 A/μs		2.4		V

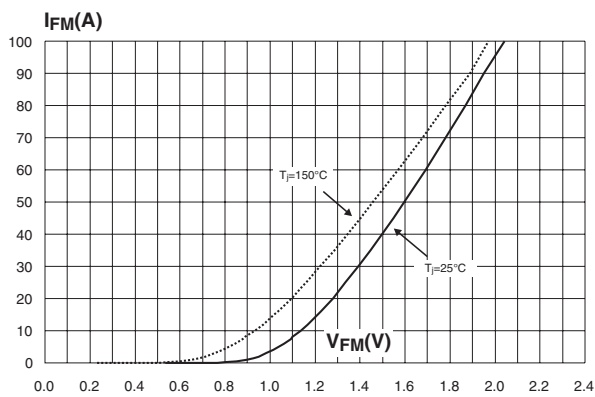
**Fig. 1:** Peak current versus duty cycle (per diode).



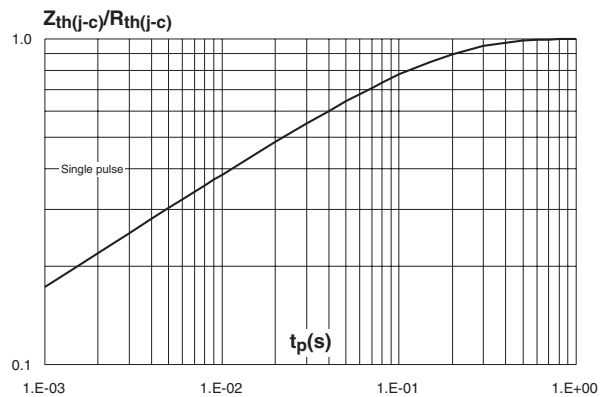
**Fig. 2-1:** Forward voltage drop versus forward current (typical values, per diode).



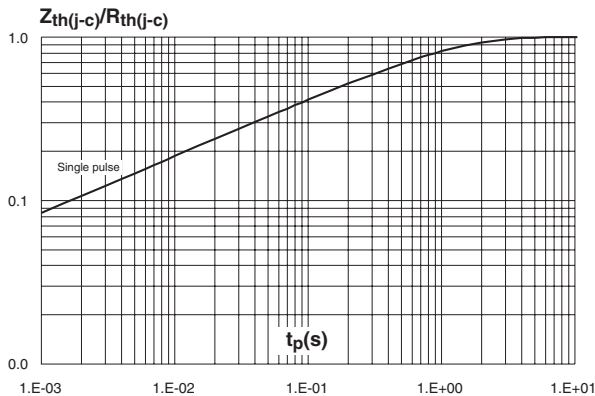
**Fig. 2-2:** Forward voltage drop versus forward current (maximum values, per diode).



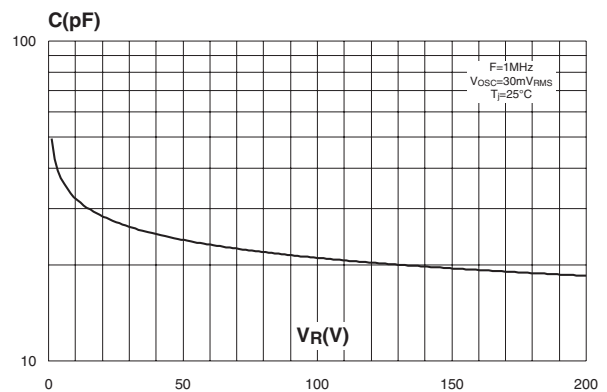
**Fig. 3-1:** Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB, D<sup>2</sup>PAK, I<sup>2</sup>PAK).



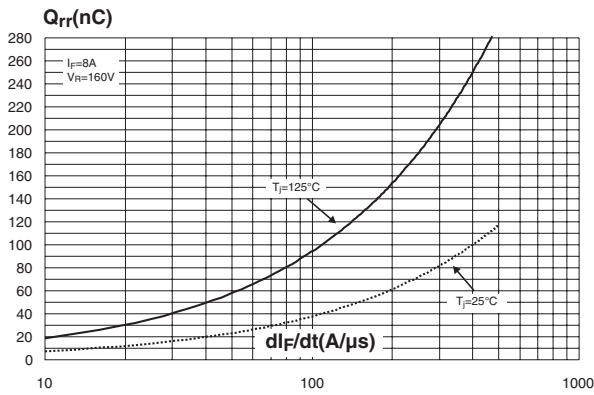
**Fig. 3-2:** Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB).



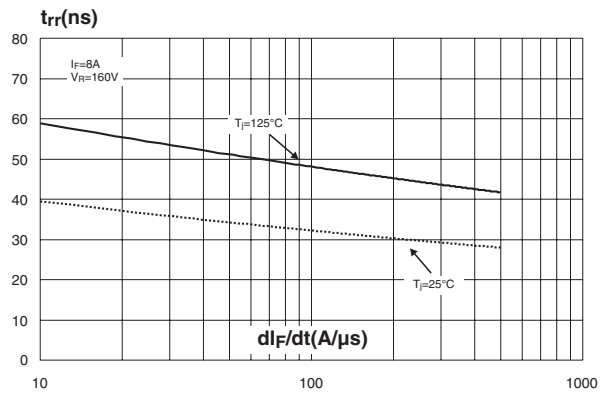
**Fig. 4:** Junction capacitance versus reverse voltage applied (typical values, per diode).



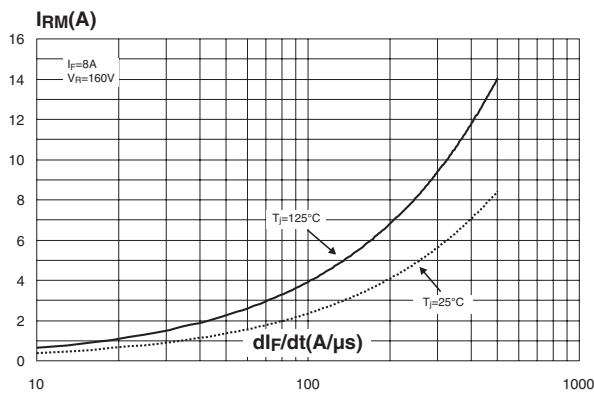
**Fig. 5:** Reverse recovery charges versus  $di_F/dt$  (typical values, per diode).



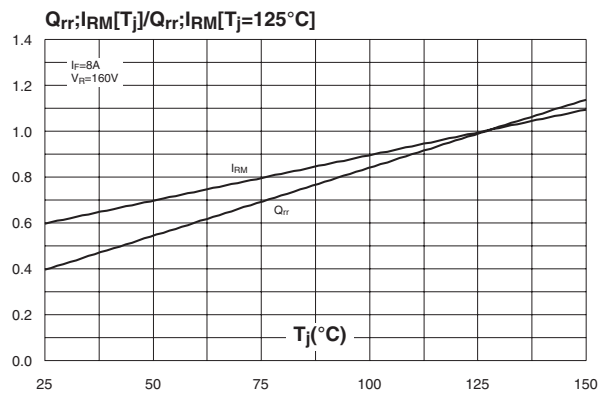
**Fig. 6:** Reverse recovery time versus  $di_F/dt$  (typical values, per diode).



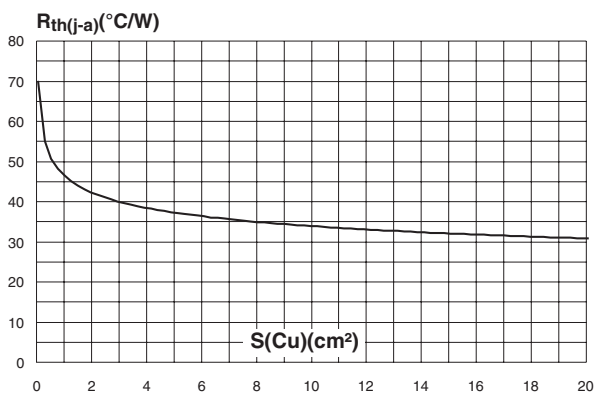
**Fig. 7:** Peak reverse recovery current versus  $di_F/dt$  (typical values, per diode).



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



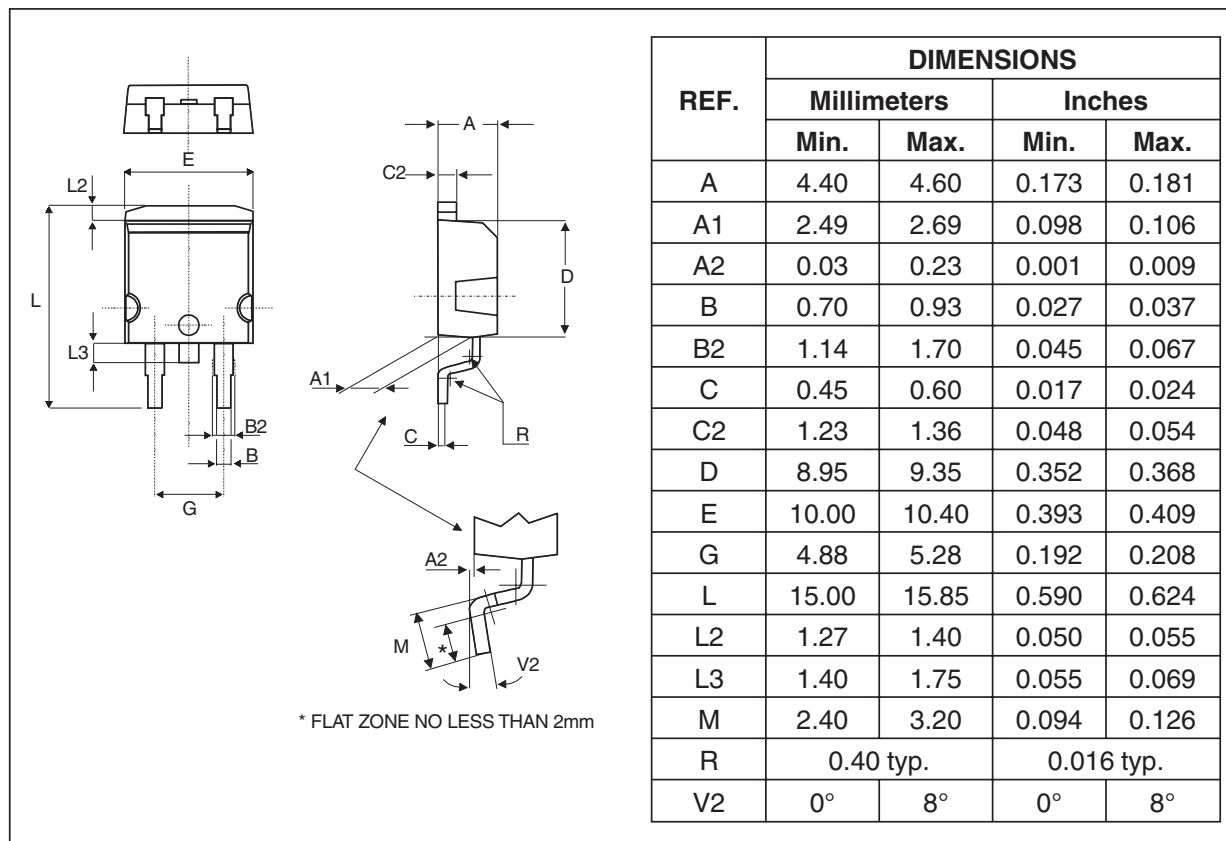
**Fig. 9:** Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board FR4,  $\epsilon_{cu}$ : 35 $\mu$ m) for D<sup>2</sup>PAK.



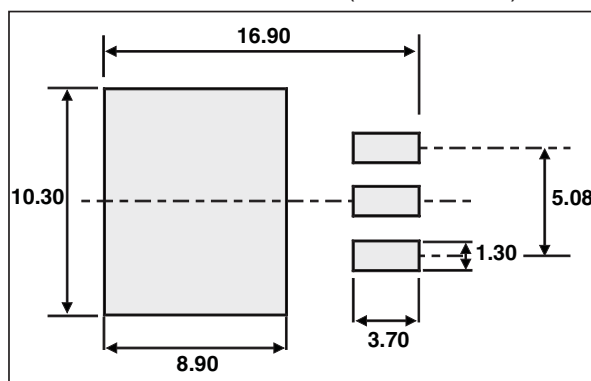
Ordering code	Marking	Package	Weight	Base qty	Delivery mode
STTH1602CT	STTH1602CT	TO-220AB	2.23 g	50	Tube
STTH1602CG	STTH1602CG	D <sup>2</sup> PAK	1.48 g	50	Tube
STTH1602CG-TR	STTH1602CG	D <sup>2</sup> PAK	1.48 g	1000	Tape & reel
STTH1602CR	STTH1602CR	I <sup>2</sup> PAK	1.49 g	50	Tube
STTH1602CFP	STTH1602CFP	TO-220FPAB	1.70g	50	Tube

**PACKAGE MECHANICAL DATA**

D<sup>2</sup>PAK

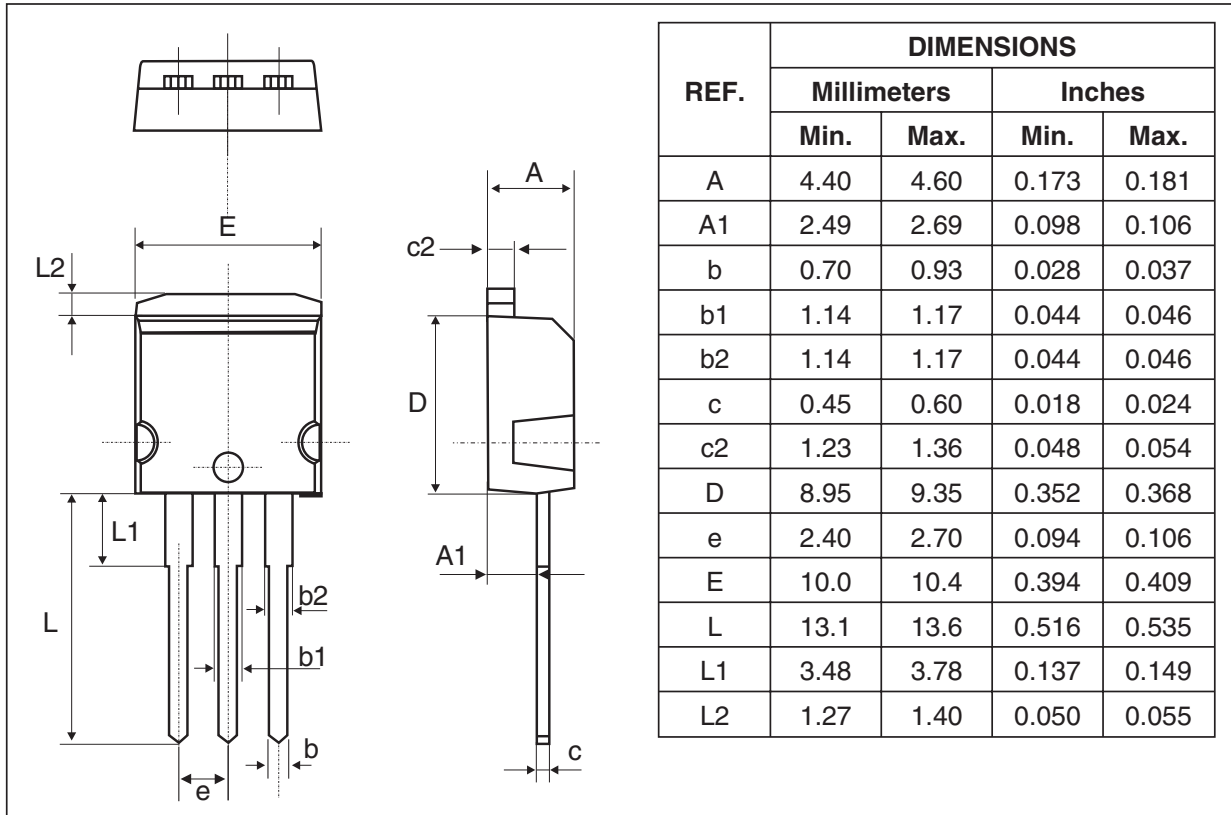


**FOOTPRINT DIMENSIONS (in millimeters)**

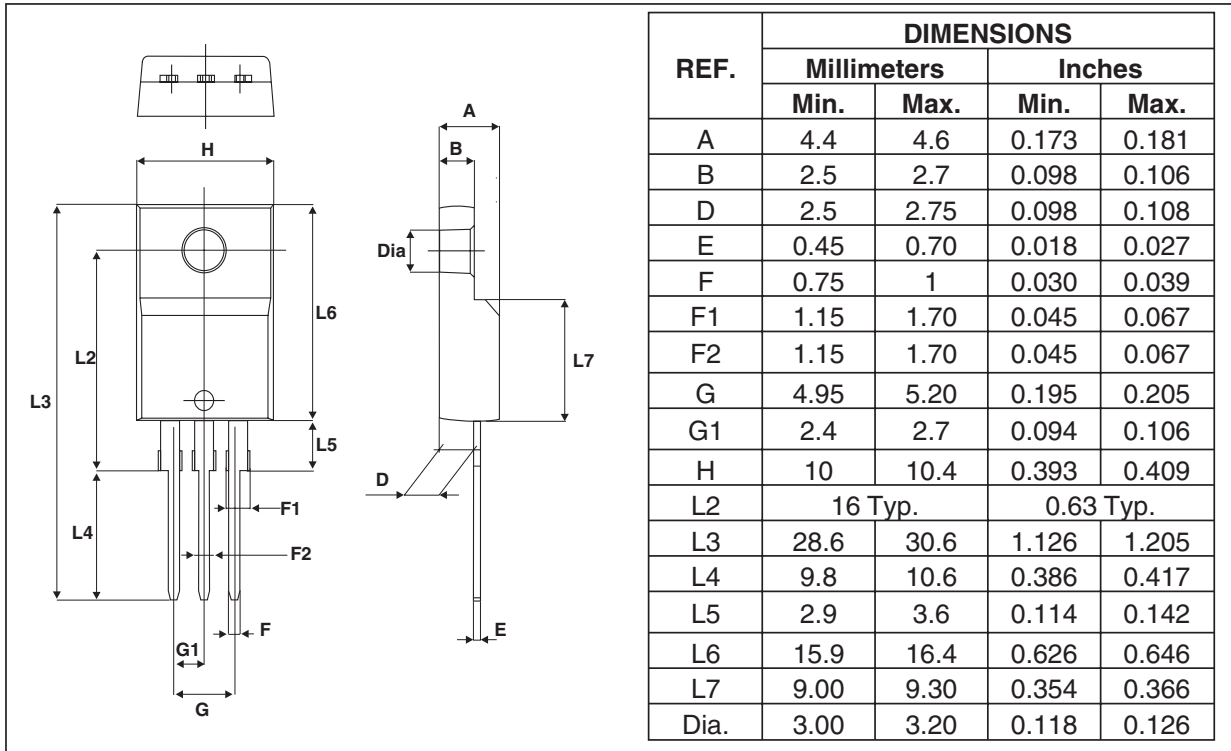


**STTH1602C**

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



**PACKAGE MECHANICAL DATA**  
TO-220FPAB



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

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
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	10.40	0.393	0.409
L2	16.4 typ.		0.645 typ.	
L4	13	14	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

- 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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